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A METEOROLOGICAL REFERENCE HANDBOOK:
for students

by E. Jan Null
Department of Agricultural Engineering

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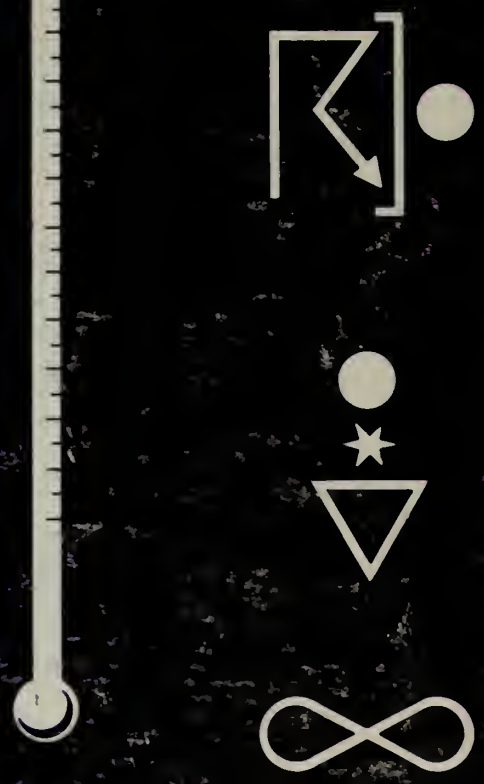

Contributions in Atmospheric Science No. 8
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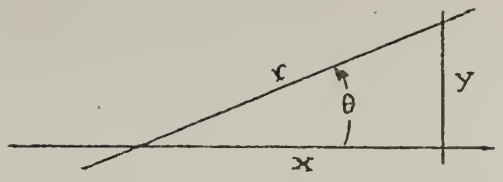
ERRATA

Page 13: add diagram



Page 15: delete $\frac{d}{dx}\ n\ u = \frac{du}{dx}\ u$

change $\frac{d}{dx}\ n\ x = \frac{1}{x}$ to $\frac{d}{dx}\ \ell n\ x = \frac{1}{x}$

delete entire vector analysis section (con't. on page 16)

add: VECTOR ANALYSIS

$$\bar{i} \cdot \bar{i} = \bar{j} \cdot \bar{j} = \bar{K} \cdot \bar{K} = 1$$

$$\bar{i} \cdot \bar{j} = \bar{j} \cdot \bar{K} = \bar{K} \cdot \bar{j} = 0$$

$$\bar{i} \times \bar{i} = \bar{j} \times \bar{j} = \bar{K} \times \bar{K} = 0$$

$$\bar{i} \times \bar{j} = \bar{K} \quad \bar{j} \times \bar{K} = \bar{i} \quad \bar{K} \times \bar{i} = \bar{j}$$

$$\bar{a} \cdot \bar{b} = \bar{b} \cdot \bar{a} = a_x b_x + a_y b_y + a_z b_z = a\, b \cos\theta$$

$$\bar{a} \times \bar{b} = -\bar{b} \times \bar{a} = \begin{vmatrix} \bar{i} & \bar{j} & \bar{K} \\ a_x & a_y & a_z \\ b_x & b_y & b_z \end{vmatrix} = (a_y b_z - b_y a_z)\,\bar{i} + (a_z b_x - b_z a_x)\,\bar{j} + (a_x b_y - b_x a_y)\,\bar{K}$$

$$\left|\bar{a} \times \bar{b}\right| = a\, b \sin\theta$$

$$\bar{a} \times \bar{b} \times \bar{c} = \bar{b}\,(\bar{a} \cdot \bar{c}) - \bar{c}\,(\bar{a} \cdot \bar{b})$$

$$\bar{a} \cdot (\bar{b} \times \bar{c}) = \bar{b} \cdot (\bar{c} \times \bar{a}) = \bar{c} \cdot (\bar{a} \times \bar{b})$$

$$\text{curl } \bar{v} = \nabla \times \bar{v} = \begin{vmatrix} \bar{i} & \bar{j} & \bar{K} \\ \frac{\partial}{\partial x} & \frac{\partial}{\partial y} & \frac{\partial}{\partial Z} \\ u & v & x \end{vmatrix}$$

$$\nabla S = \text{grad } S = \frac{\partial S}{\partial x}\,\bar{i} + \frac{\partial S}{\partial y}\,\bar{j} + \frac{\partial S}{\partial Z}\,\bar{K}$$

$$\nabla^2 \bar{v} = \bar{i}\,\nabla^2 a + \bar{j}\,\nabla^2 b + K\,\nabla^2 c$$

$$\text{div grad } S = \nabla^2 S = \frac{\partial^2 S}{\partial x^2} + \frac{\partial^2 S}{\partial y^2} + \frac{\partial^2 S}{\partial Z^2}$$

Page 21: change Specific heat, constant to:
Specific heat, v constant

Page 23: change Fiest to First

Please refer any further errata to E. Jan Null,
c/o Department of Agricultural Engineering
University of California, Davis Thank you.

A METEOROLOGICAL REFERENCE HANDBOOK: for students

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University of California
Davis

Contributions in Atmospheric Science, No. 8

INTRODUCTION

The purpose of this publication is to provide the student of meteorology with an economical "hands-on" source of basic meteorological data and material. It is not meant to replace such works as the Smithsonian Tables, Handbook of Meteorology and/or meteorological textbooks but rather to supplement them.

I wish to acknowledge and thank the National Weather Service, U.S. Air Force, and Stanford Research Institute for permission to reproduce materials contained herein.

I also wish to express my most sincere thanks to Drs. Wilson B. Goddard, John J. Carroll, Leonard O. Myrup, Allan Tangren, along with the Department of Agricultural Engineering, University of California, Davis, for their assistance in this undertaking.

Finally, I must thank my wife, Sally, for her patience and understanding these last several months of tedium.

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PHYSICAL DIMENSIONS AND CONVERSION

Quantity	Dimensions	CGS	MKS
time	T	sec (s)	sec (s)
mass	M	gram (gm)	kilogram (kg)
length	L	centimeter (cm)	meter (m)
angular displacement	-	degrees °	degrees °
area	L^2	cm^2	m^2
volume	L^3	cm^3	m^3
density	ML^{-3}	$gm\text{-}cm^{-3}$	$Kg\text{-}m^{-3}$
speed	LT^{-1}	$cm\text{-}s^{-1}$	$m\text{-}s^{-1}$
force	MLT^{-2}	$gm\text{-}cm\text{-}s^{-2}$ = dyne	$Kg\text{-}m\text{-}s^{-2}$ = newton (nt)
pressure	$ML^{-1}T^{-2}$	$gm\text{-}cm^{-1}\text{-}s^{-2}$ = $dyne\text{-}cm^{-2}$	$Kg\text{-}m^{-1}\text{-}s^{-2}$ = $nt\text{-}m^2$
energy	ML^2T^{-2}	$gm\text{-}cm^2\text{-}s^{-2}$ = erg	$Kg\text{-}m^2\text{-}s^{-2}$ = joule
power	ML^2T^{-3}	$gm\text{-}cm^2\text{-}s^{-3}$ = $erg\text{-}sec^{-1}$	$Kg\text{-}m^2\text{-}s^{-3}$ = $joule\text{-}s^{-1}$
energy/area	MT^{-2}	$gm\text{-}s^{-2}$ = $erg\text{-}cm^2$	$Kg\text{-}s^{-2}$ = $joules\text{-}m^2$
power/area	MT^{-3}	$gm\text{-}s^{-3}$	$Kg\text{-}s^{-3}$
acceleration	LT^{-2}	$cm\text{-}s^{-2}$	ms^{-2}
angular velocity	T^{-1}	sec^{-1}	sec^{-1}
angular acceleration	T^{-2}	sec^{-2}	sec^{-2}
frequency	T^{-1}	sec^{-1}	sec^{-1}
momentum	MLT^{-1}	$gm\text{-}cm\text{-}s^{-1}$	$Kg\text{-}m\ s^{-1}$
period	T	sec	sec
rotational inertia	ML^2	$gm\text{-}cm^2$	$Kg\text{-}m^2$
torque	ML^2T^{-2}	$gm\text{-}cm^2s^{-2}$	Kgm^2s^{-2}
wavelength	L	cm	m
specific vol.	L^3M^{-1}	cm^3g^{-1}	m^3Kg^{-1}
viscosity (dyn)	$ML^{-1}T^{-1}$	$gcm^{-1}s^{-1}$	$Kgm^{-1}s^{-1}$
viscosity (kine)	L^2T^{-1}	cm^2s^{-1}	m^2sec^{-1}

TIME

	sec	min	hr	day	year
1 second (s) =	1	$1.66\overline{6} \times 10^{-2}$	$2.77\overline{7} \times 10^{-4}$	1.1574×10^{-6}	3.169×10^{-8}
1 minute (min) =	60	1	$1.66\overline{6} \times 10^{-2}$	$6.944\overline{4} \times 10^{-4}$	1.901×10^{-6}
1 hour (hr) =	3600	60	1	$4.166\overline{6} \times 10^{-2}$	1.414×10^{-4}
1 day (solar)(dy) =	8.64×10^{4}	1440	24	1	2.738×10^{-3}
1 year (solar)(yr) =	3.15576×10^{7}	5.2596×10^{5}	8766	365.25	1

MASS

	gm	Kg	slug	grain	ounce	pound
1 gram = (gm)	1	10^{-3}	6.852×10^{-5}	15.4324	3.5274×10^{-2}	2.204623×10^{-3}
1 kilogram = (kg)	10^{3}	1	6.852×10^{-2}	1.54324×10^{-2}	35.274	2.204623
1 slug =	1.459×10^{4}	14.59	1	.225159	514.8	32.17
1 grain = (gr)	6.47989×10^{-2}	6.47989×10^{-5}	4.44131	1	2.28571×10^{-3}	1.42857×10^{-4}
1 ounce = (oz)	28.3495	2.83495×10^{-2}	1.943×10^{-3}	437.5	1	.0625
1 pound = (lb)	453.5923	.4535923	3.108×10^{-2}	7000	16	1

LENGTH

	cm	m	km	in	ft	mi	n.mi
1 centimeter (cm) =	1	10^{-2}	10^{-5}	.3937	.0328167	6.214×10^{-6}	5.39593×10^{-6}
1 meter (m) =	10^{2}	1	10^{-3}	39.37	3.28167	6.214×10^{-4}	5.39593×10^{-4}
1 kilogram (km) =	10^{5}	10^{3}	1	3.937×10^{4}	3.28167×10^{3}	.6214	.539593
1 inch (in) =	2.54	.0254	2.54×10^{-5}	1	$8.3\overline{3} \times 10^{-2}$	1.578×10^{-5}	1.3708×10^{-6}
1 ft (ft) =	30.48	.3048	3.048×10^{-4}	12	1	1.8939×10^{-4}	1.645×10^{-4}
1 mile (mi) =	160934.4	1609.344	1.609344	63360	5280	1	.868391
1 nautical mile (n.mi) =	185200	1852	1.852	72913.2	6076.1	1.150779	1

ANGULAR DISPLACEMENT

	"	'	°	rad	rev
1 second (") =	1	$1.66\overline{6} \times 10^{-2}$	2.778×10^{-4}	4.8482×10^{-6}	7.7160×10^{-7}
1 minute (') =	60	1	$1.66\overline{6} \times 10^{-2}$	2.9088×10^{-4}	4.6296×10^{-5}
1 degree (°) =	3600	60	1	1.7453×10^{-2}	$2.77\overline{7} \times 10^{-3}$
1 radian (rad) =	2.0626×10^{5}	3.4378×10^{3}	57.2958	1	.15916
1 revolution (rev) =	1.296×10^{6}	2.16×10^{4}	360	6.2832	1

AREA

	cm^2	m^2	in^2	ft^2
$1\ cm^2$ =	1	10^{-4}	.15500	1.0763×10^{-3}
$1\ m^2$ =	10^4	1	1.5500×10^3	10.763
$1\ in^2$ =	6.4516	6.4516×10^{-4}	1	6.9444×10^{-3}
$1\ ft^2$ =	929.03	9.2903×10^{-2}	144	1

VOLUME

	cm^3	m^3	in^3	ft^3
$1\ cm^3$ =	1	10^{-6}	6.1024×10^{-2}	3.5314×10^{-5}
$1\ m^3$ =	10^6	1	6.1024×10^4	35.314
$1\ in^3$ =	16.387	1.6387×10^{-5}	1	5.787×10^{-4}
$1\ ft^3$ =	28317	2.8317×10^2	1728	1

DENSITY

	$gm\text{-}cm^{-3}$	$Kg\text{-}m^{-3}$	$slug\text{-}ft^{-3}$	$lb\text{-}in^{-3}$	$lb\text{-}ft^{-3}$
1 $gm\text{-}cm^{-3}$	1	10^{3}	1.940	3.613×10^{-2}	62.428
$Kg\text{-}m^{-3}$	10^{-3}	1	1.940×10^{-3}	3.613×10^{-5}	6.2428×10^{-2}
1 $slug\text{-}ft^{3}$	.5154	515.4	1	1.862×10^{-2}	32.17
1 $lb\text{-}in^{3}$	27.68	2.768×10^{4}	53.71	1	1728
1 $lb\text{-}ft^{3}$	1.6019×10^{-2}	16.019	3.108×10^{-2}	5.787×10^{-4}	1

SPEED

	$cm\text{-}sec^{-1}$	$m\text{-}sec^{-1}$	$km\text{-}hr^{-1}$	$ft\text{-}sec^{-1}$	$mi\text{-}hr^{-1}$	knot
1 $cm\text{-}sec^{-1}$ =	1	10^{-2}	.036	3.2808×10^{-2}	2.2369×10^{-2}	1.9425×10^{-2}
1 $m\text{-}sec^{-1}$ =	10^{2}	1	3.6	3.2808	2.2369	1.9425
1 $km\text{-}hr^{-1}$ =	$27.7\overline{7}$	$.27\overline{77}$	1	.91134	.62137	.53959
1 $ft\text{-}sec^{-1}$ =	30.48	.3048	1.0973	1	.68182	.59209
1 $mi\text{-}hr^{-1}$ =	44.704	.44704	1.6093	$1.46\overline{6}$	1	.86839
1 $naut.mi\text{-}hr^{-1}$ (knot) =	51.479	.51479	1.85325	1.6880	1.1516	1

FORCE

	dyne	nt	lb
1 dyne	1	10^{-5}	2.2481×10^{-6}
1 newton (nt)	10^{5}	1	.22481
1 pound (lb)	4.4482×10^{5}	4.4482	1

PRESSURE

	$dyne\text{-}cm^{-2}$	$nt\text{-}m^{-2}$	mb	mm Hg	in Hg	$lb\text{-}in^{-2}$	$Kg\text{-}cm^{-2}$	std.atm
1 $dyne\text{-}cm^{-2}$ =	1	.1	10^{-3}	7.5006×10^{-4}	2.9530×10^{-5}	1.4504×10^{-5}	1.0197×10^{-6}	9.8692×10^{-7}
1 $newton\text{-}m^{-2}$ =	10'	1'	10^{-2}	7.5006×10^{-3}	2.9530×10^{-4}	1.4504×10^{-4}	1.0197×10^{-5}	9.8692×10^{-6}
1 millibar (mb) =	10^{3}	10^{2}	1	7.5006×10^{-1}	2.9530×10^{-2}	1.4504×10^{-2}	1.0197×10^{-3}	9.8692×10^{-4}
1 mm Hg (std) =	1333.2	133.32	1.3332	1	3.9370×10^{-2}	1.9337×10^{-2}	1.3595×10^{-3}	1.3158×10^{-3}
1 in Hg (std) =	3.3864×10^{4}	3.3864×10^{3}	33.864	25.4	1	.49115	3.4532×10^{-2}	3.3421×10^{-2}
1 $lb\text{-}in^{-2}$ =	6.8948×10^{4}	6.8948×10^{3}	68.948	51.715	2.0360	1	7.0307×10^{-2}	6.8045×10^{-2}
1 $Kg\text{-}cm^{-2}$ =	98067	9806.7	980.67	735.56	28.959	14.223	1	.96784
1 std. atm =	1.01325×10^{6}	1.01325×10^{5}	1013.25	760	29.921	14.696	1.0332	1

ENERGY

	erg	joule	ft-lb	cal	Kcal	kw-hr
1 erg =	1	10^{-7}	7.3756×10^{-8}	2.3892×10^{-8}	2.3892×10^{-11}	$2.77\overline{7} \times 10^{-14}$
1 joule =	10^{7}	1	.73756	.23892	2.3892×10^{-4}	$2.77\overline{7} \times 10^{-7}$
1 ft-lb =	1.3558×10^{7}	1.3558	1	.32392	3.2392×10^{-4}	3.7662×10^{-7}
1 cal =	4.1855×10^{7}	4.1855	3.0871	1	10^{-3}	1.1626×10^{-6}
1 Kcal =	4.1855×10^{10}	4.1855×10	3.0871×10^{3}	10^{3}	1	1.1626×10^{-3}
1 kilowatt-hr (kw-hr) =	3.6×10^{13}	3.6×10^{6}	2.6552×10^{6}	8.6011×10^{5}	8.6011×10^{2}	1

ENERGY FLUX

	ly s^{-1}	ly min^{-1}	watt cm^{-2}	BTU $ft^{2}min^{-1}$
1 cal $cm^{-2}sec^{-1}$ (ly s^{-1}) =	1	$.01666\overline{6}$	1.1626×10^{-3}	.061425
1 cal $cm^{-2}min^{-1}$ (ly min^{-1}) =	60	1	.069758	3.6855
1 watt cm^{-2} =	860.12	14.335	1	52.833
1 BTU $ft^{-2}min^{-1}$ =	16.280	.27133	.018928	1

OTHER CONVERSIONS

Length	1 Angstrom (Å) = 10^{-8} cm
	1 micron (μ) = 10^{-4}
	1 millimeter (mm) = 10^{-1} cm
	1 degree lat = 1.11137×10^{7}
	= 69.057 mi
	= 59.969 naut. mi
Time	1 sidereal day = 23 hr 56 min 4.091 sec
Force	1 poundal = 13825.5 dynes
Pressure	1 centibar = 10 mb
	1 bar = 10^{3} mb
	1 45° mm Hg = .999950 mm Hg (std)
	1 45° in Hg = .999950 in Hg (std)
	1 in H_2O (5°C) = 2.491 mb
Energy	1 I.T. cal = 1.00032 cal
	1 Int'l Kw-hr = 1.00019 Kw-hr
	1 BTU = 252.08 cal
Energy/Area	1 langley (ly) = 1 cal-cm^{-2}
Power	1 watt (wt) = 1 joule sec^{-1}
	= .23892 cal sec^{-1}
Energy Flux	1 cal-$cm^{-2}min^{-1}$ = 1 ly-min^{-1}
Viscosity (dynamic)	1 poise (P) = 1 dyne sec cm^{-2}
Viscosity (kinematic)	1 stoke (St) = 1 $cm^{2}sec^{-1}$
Temperature	°C = $(^{5}/_{9})$(°F - 32°F)
	°F = $(^{9}/_{5})$ °C + 32°F
	°K = °C + 273.16°C

MATHEMATICAL CONSTANTS & DEFINITIONS

Constants

$\pi = 3.14159$

$2\pi = 6.283185$

$1/\pi = .31831$

$\pi^2 = 9.86960$

$e = 2.71828$ $\qquad \log e = .43429$

$2e = 5.43656$

$1/e = .36788$

$e = 7.38906$

$\sqrt{2} = 1.41421$

$\sqrt{3} = 1.73205$

Quadratic Formula: $\qquad ax^2 + bx + c = 0$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Trigonometric Functions

$$\sin \theta = y/r \qquad \csc \theta = r/y$$
$$\cos \theta = x/r \qquad \sec \theta = r/x$$
$$\tan \theta = y/x \qquad \cot \theta = x/y$$

$$\sin^2 \theta + \cos^2 \theta = 1$$
$$\sec^2 \theta - \tan^2 \theta = 1$$
$$\csc^2 \theta - \cot^2 \theta = 1$$
$$\sin (\alpha \pm \beta) = \sin \alpha \cos \beta \pm \cos \alpha \sin \beta$$
$$\cos (\alpha \pm \beta) = \cos \alpha \cos \beta \mp \sin \alpha \sin \beta$$
$$\tan (\alpha \pm \beta) = \frac{\tan \alpha \pm \tan \beta}{1 \mp \tan \alpha \tan \beta}$$
$$\sin 2\theta = 2 \sin \theta \cos \theta$$
$$\cos 2\theta = \cos^2 \theta - \sin^2 \theta$$
$$= 2 \cos^2 \theta - 1$$
$$= 1 - 2 \sin^2 \theta$$

$$\sin \theta = \frac{e^{i\theta} - e^{-i\theta}}{2i}$$

$$\cos \theta = \frac{e^{i\theta} + e^{-i\theta}}{2}$$

$$e^{\pm j\theta} = \cos \theta \pm j \sin \theta$$

Series Expansions

$$f(x_o + x) = f(x_o) + f'(x_o)\, x + f''(x_o \frac{x^2}{2!} + f'''(x_o) \frac{x^3}{3!} \ldots\ldots$$

$$\frac{1}{1+x} = 1 - x + x^2 - x^3 + \ldots\ldots$$

$$\sqrt{1 + x} = 1 + \frac{x}{2} - \frac{x^2}{8} + \frac{x^3}{16} - \ldots\ldots$$

$$\frac{1}{\sqrt{1+x}} = 1 - \frac{x}{2} + \frac{3x^2}{8} - \frac{5x^3}{16} + \ldots\ldots$$

$$e^x = 1 + x + \frac{x^2}{2} + \frac{x^3}{6} + \ldots\ldots$$

$$\sin x = x - \frac{x^3}{6} + \frac{x^5}{120} - \ldots\ldots \qquad \text{for x in radians, } x \neq 0$$

$$\cos x = 1 - \frac{x^2}{2} + \frac{x^4}{24} - \ldots\ldots \qquad \text{for x in radians, } x \neq 0$$

$$\tan x = x + \frac{x^3}{3} + \frac{2x^5}{15} + \ldots\ldots \qquad \text{for x in radian, } -\pi/2 < x < \pi/2$$

DERIVATIVES and INTEGRALS

$$\frac{d}{dx}\sin\theta = \cos\theta\,\frac{d\theta}{dx}$$

$$\frac{d}{dx}\cos\theta = -\sin\theta\,\frac{d\theta}{dx}$$

$$\frac{d}{dx}\tan\theta = \sec^2\theta\,\frac{d\theta}{dx}$$

$$\frac{d}{dx}\cot\theta = -\csc^2\theta\,\frac{d\theta}{dx}$$

$$\frac{d}{dx}\sec\theta = \sec\theta\tan\theta\,\frac{d\theta}{dx}$$

$$\frac{d}{dx}\csc\theta = -\sec\theta\cot\theta\,\frac{d\theta}{dx}$$

~~$\frac{d}{dx}\,u\,u = \frac{du}{dx}\,u$~~

$$\frac{d}{dx}e^u = e^u\,\frac{du}{dx}$$

$$\frac{d}{dx}\ell n\,x = \frac{1}{x}$$

$$\int \sin x\,dx = -\cos x + C$$

$$\int \cos x\,dx = \sin x + C$$

$$\int \tan x\,dx = \ell n|\sec|x + C$$

$$\int \cot x\,dx = \ell n|\sin x| + C$$

$$\int \sec x\,dx = \ell n|\sec x + \tan x| + C$$

$$\int \csc x\,dx = \ell n|\csc x - \cot x| + C$$

$$\int \ell n\,x\,dx = x\,\ell n\,x - x + C$$

$$\int e^u\,du = e^u + C$$

$$\int u\,dv = uv - v\,du$$

$$\int \frac{dx}{x} = \ell n\,x + C$$

VECTOR ANALYSIS

$$i \cdot 1 = j \cdot j = K \cdot K = 1$$

$$i \cdot j = j \cdot K = K \cdot j = 0$$

$$i \times i = j \times j = K \times K = 0$$

$$i \times j = K \qquad j \times K = i \qquad K \times i = j$$

$$a \cdot b = b \cdot a = a_x b_x + a_y b_y + a_Z b_Z = a\,b\cos\theta$$

$$a \times b = -\,b \times a = \begin{vmatrix} i & j & K \\ a_x & a_y & a_Z \\ b_x & b_y & b_Z \end{vmatrix} = \begin{matrix} (a_y b_Z - b_y a_Z)\,i\,t \\ (a_Z b_x - b_Z a_x)\,j\,t \\ (a_x b_y - b_x a_y)\,K \end{matrix}$$

$$|a \times b| = a\,b\sin\theta$$

$$a \times b \times c = b\,(a \cdot c) - c\,(a \cdot b)$$

$$a \cdot (b \times c) = (a \times b)\,{}^{\circ}c = -\,b \cdot (a \times c)$$

$$\text{div}\,v = \nabla \circ v = \frac{\partial u:}{\partial x:}$$

$$\text{curl } v = \nabla \times v = \begin{vmatrix} i & j & K \\ \frac{\partial}{\partial x} & \frac{\partial}{\partial y} & \frac{\partial}{\partial Z} \\ u & v & w \end{vmatrix}$$

$$\nabla a = \frac{\partial a}{\partial x} i + \frac{\partial a}{\partial y} j + \frac{\partial a}{\partial Z} K$$

$$\frac{da}{dt} = \frac{\partial a}{t} + v \circ \nabla a$$

GREEK ALPHABET

alpha	A	α
beta	B	β
gamma	Γ	γ
delta	Δ	δ
epsilon	E	ε
zeta	Z	ζ
eta	H	η
theta	Θ	θ
iota	I	ι
kappa	K	κ
lambda	Λ	λ
mu	M	μ
nu	N	ν
xi	Ξ	ξ
omicron	O	o
pi	Π	π
rho	P	ρ
sigma	Σ	σ
tau	T	τ
upsilon	T	υ
phi	Φ	ϕ
chi	X	χ
psi	Ψ	ψ
omega	Ω	ω

METEOROLOGICAL SYMBOLS

A	area; albedo; Angstrom(s); eddy diffusion coefficient
a	radius of earth; acceleration; characteristic length; parameter in theory of Ekman spiral
a_λ	fractional absorption
b	specific enthalpy; constant in Wien's radiation law
C	heat capacity; circulation
C_x $C_y C_z$	velocity components of a moving point
c	specific heat capacity; speed of light; horiz. wind speed
c_1, c_2	constants in Planch's law
c*	any of three Cortesian components of velocity
c_g	geostrophic wind speed
c_p, c_v	specific heat capacity at constant pressure and volume
c_w	specific heat capacity of liquid water
D	horizontal divergence; depth of an air column
D	differential at point moving w/arbitrary vel.; dissipation rate of horiz. K.E. for a given vol.
d	dissipation rate of horiz. K.E./unit vol.
E	energy of a quantum; rate of evaporation
E_i	internal energy per unit horiz. area
E_k	K.E. per unit horiz. area
E_p	P.E. per unit horiz. area
E_λ	monochromatic intensity of emission of radiation
e	natural base of logarithms
e	water substance pressure; vapor pressure
e_s	saturation vapor pressure
F	a function; force; area enclosed by projection on an equatorial plane; Froude number
F_x, F_y, F_z	viscous and frictional forces per unit mass
f	Coriolis parameter
G	force of Newtonian gravitation per unit mass
g	acceleration of gravity
H	heat; height of homogeneous atmosphere; grad. wind level
h	heat per unit mass; Planch's constant
I_λ	monochromatic intensity of radiation
i	square root of minus one

J	any atmospheric property per unit mass
K	constant
k	constant; von Karman's constant
k_λ	absorption coefficient
L	latent heat of a phase change; wavelength
$[L]$	dimension of length
$\mathcal{L}_\lambda$	smoothed absorption coefficient
ℓ_x, ℓ_y, ℓ_z	root-mean-square mixing lengths
ℓ'	distance moved by a parcel in mixing length theory
M	mass; mass of air
$[M]$	dimension of mass
m	molecular weight; mass of a body; non-dimensional exponent; absolute angular momentum
$\overline{m}$	mean molecular weight of a mixture
n	a natural coordinate
p	pressure
Q	heat energy
q	specific humidity; any atmospheric property
R	specific gas constant; radial distance from an axis of rotation
R^*	universal gas constant
R_e	Reynolds number
R_i	Richardson number
R_o	Rossby number
r	relative humidity; radial distance in polar coordinates
S	solar constant; source or sink of an atmospheric property; a displacement
s	a natural coordinate
T	Kelvin temperature; period of oscillation
T^*	absolute virtual temperature
$[T]$	dimension of time
T_d	dew point temperature
T_e	equivalent temperature
T_q	rate of upward eddy transport of specific humidity
T_w	wet-bulb temperature
t	time, centigrade temperature

U	internal energy; constant westerly component; representative wind speed
u	specific internal energy; optical depth; eastward component of velocity
$\bar{u}$	mean eastward speed
u'	perturbation value of eastward speed; instantaneous departure from mean eastward speed
u_*	friction velocity
u_g	geostrophic eastward speed
u_o	eastward component of pure translation
V	volume, velocity
v	northward component of velocity
v_o	northward component of pure translation
v_r	radial speed
v	tangential speed
W	work
w	specific work, mixing ratio; vertical velocity
w_e	specific liquid water content
w_s	saturation mixing ratio
x	Cortesian coordinate; eastward component
y	Cortesian coordinate; northward component
z	Cortesian coordinate, vertical component
z_o	roughness parameter
ρ	(Heb. reysch) a representative density
∇^2	LaPlacian operator
α	specific volume; angle between winds and isobars
β	rate of change of the Coriolis parameter w/ distance northward
Γ_d	dry adiabatic lapse rate
Γ_s	saturation pseudo-adiabatic lapse rate
γ	lapse rate w/ temperature; ratio of specific heat capacities at constant pressure and volume
γ_n	lapse rate for neutral equilibrium
ε	ratio of molecular rates of water and dry air
ξ	a Cortesian coordinate; relative vorticity about the vertical
η	a Cortesian coordinate
θ	angle; potential temperature; zenith angle; a polar coordinate
$[\theta]$	dimension of temperature equivalent potential temperature
θ_e	equivalent potential temperature

θ_w	wet-bulb potential temperature
κ	ratio of specific gas constant to specific heat capacity for dry air
λ	wavelength
μ	micron; dynamic coefficient of viscosity
μ_e	dynamic coefficient of eddy viscosity or Austausch coefficient
ν	frequency; kinematic coefficient of viscosity
ρ	density
ρ_v	absolute humidity
σ	Stefan-Boltymann constant
τ	period; optical thickness; stress
τ	transmission function
φ	normal probability integral
ϕ	specific entropy; latitude
χ	a Cortesian coordinate
Ψ	geopotential measured in geopotential meters
ψ	geopotential; stream function
Ω	angular velocity of rotation of earth; characteristic frequency
ω	angular velocity; individual derivative of pressure w/ time

GEODETIC CONSTANTS

Polar radius of earth	$R_p = 6.3569 \times 10^8$ cm
Equatorial radius of earth	$R_e = 6.3784 \times 10^8$ cm
Mean radius of earth	$R = 6.3712 \times 10^8$ cm
Mean density	$\rho = 5.522$ g cm^{-3}
Mass	$M = 5.983 \times 10^{27}$ g
Gravity (equator)	$g_e = 978.039$ cm s^{-2}
(pole)	$g_p = 983.217$ cm s^{-2}
(mean)	$g = 980.665$ cm s^{-2}
Angular velocity	$\Omega = 7.292 \times 10^{-5}$ s^{-1}
Volume	$V_e = 1.087 \times 10^{27}$ cm^3
Mean distance to sun	$d = 1.4968 \times 10^{13}$ cm
Solar constant	$S = 1.98$ ly min^{-1}
Circumference (mean)	$c = 4.0031 \times 10^9$ cm

1° lat (in statute miles) = $69.0569 - 0.3494 \cos 2\phi + .0007 \cos 4\phi$

1° long (in statute miles) = $69.2316 \cos \phi - 0.0584 \cos 3\phi + .0001 \cos 5\phi$

Gravity $g = 9.78049 (1 + 0.0052884 \sin^2 \phi - .0000059 \sin^2 2\phi)$ ms^{-2}

THERMODYNAMIC CONSTANTS

Universal gas constant

$R^* = 8.3144 \times 10^7$ erg mol^{-1} $°K^{-1}$

$= 1.9858$ cal mol^{-1} $°K^{-1}$

Data for dry air:

Gas constant

$R_d = 2.8704 \times 10^6$ erg g^{-1} $°K^{-1}$

$= 6.8557 \times 10^{-2}$ cal g^{-1} $°K^{-1}$

Specific heat, p constant

$c_{pd} = {}^{7R_d}/_{2}$

$= 1.0046 \times 10^7$ ergs g^{-1} $°K^{-1}$

$= .240$ cal g^{-1} $°K^{-1}$

Specific heat, v constant

$c_{vd} = {}^{5R_d}/_{2}$

$= 7.176 \times 10^6$ erg g^{-1} $°K^{-1}$

$= .1714$ cal g^{-1} $°K^{-1}$

Ratio

${}^{c_{pd}}/_{c_{vd}} = 1.4$

(Poisson constant)

${}^{R_d}/_{c_{pd}} = {}^{2}/_{7} = .2857$

Difference

$c_{pd} = c_{vd} = R_d = 2.8704 \times 10^6$ ergs g^{-1} $°K^{-1}$

Molecular weight

$m_d = 28.966$

Data for water vapor:

Gas constant

$R_v = 4.6150 \times 10^6$ erg g^{-1} $°K^{-1}$

$= 1.1023 \times 10^{-1}$ cal g^{-1} $°K^{-1}$

Specific heat, p constant

$c_{pv} = 4R_v$

$= 1.847 \times 10^7$ erg g^{-1} $°K^{-1}$

$= 4.409 \times 10^{-1}$ cal g^{-1} $°K^{-1}$

Specific heat, constant

$c_{vv} = 3R_v$

$= 1.386 \times 10^7$ ergs g^{-1} $°K^{-1}$

$= 3.3068 \times 10^{-1}$ cal g^{-1} $°K^{-1}$

Ratio

${}^{c_{pv}}/_{c_{vv}} = 1.3\overline{3}$

Difference

$c_{pv} - c_{vv} = R_v = 4.6150 \times 10^6$ erg g^{-1} $°K^{-1}$

Molecular weight

$m_v = 18.016$

Data for water:

Specific heat	$c_w = 4.1855 \times 10^{7}$ ergs g^{-1} $°K^{-1}$
	$= 1.000$ cal g^{-1} $°K^{-1}$
	$c_{ice} = 2.0928 \times 10^{-7}$ erg g^{-1} $°K^{-1}$
	$= .5$ cal g^{-1} $°K^{-1}$

Latent heat:

Vaporization	$L = (2.500 - 0.25\ T) \times 10^{10}$ ergs g^{-1}
	$= 597 - .57\ T$ cal g^{-1}
Sublimation	$L_{iv} = 2.835 \times 10^{10}$ ergs g^{-1}
	$= 677$ cal g^{-1}
Fusion	$L_{iw} = (.33 + .025\ T) \times 10^{10}$ ergs g^{-1}
	$= 79.7$ cal g^{-1}
Ratio m_v/m_d:	$\varepsilon = m_v/m_d = .62197$
Evaporation	1 ly = .0171 mm H_2O
Evapotranspiration	1 mm H_2O/day = 0.404 ly/min = 28.2 w/m^2

PHYSICAL CONSTANTS

Velocity of light	$c = 2.997925 \times 10$ cm s^{-1}
Boltzmann's constant	$k = 1.3805 \times 10^{-16}$ ergs $°K^{-1}$
Avogadro's constant	$n = 6.02257 \times 10^{23}$ (g mol)$^{-1}$
Plancks constant	$h = 6.6256 \times 10^{-27}$ erg sec
Wien displacement constant	$\lambda_{mat} T = .28978$ cm °K
Stefan-Boltzmann constant	$\sigma = 5.6697 \times 10^{-5}$ erg cm^{-2} $°K^{-4}$ s^{-1}
Standard vol of gas (1 atm; °C)	$v_m = 22.415 \times 10^{3}$ cm^3 mol^{-1}
Root mean square vel. of molecules (15°C)	$v_m = 4.98 \times 10^{4}$ cm s^{-1}
Velocity of sound at (15°C)	$c_s = 3.406 \times 10^{4}$ cm s^{-1}
First radiation constant	$c_1 = 8\ hc = 4.99208 \times 10^{-15}$ erg cm
Second radiation constant	$c_2 = hcN/R_o = 1.4388$ cm °K
Electron charge	$e = 1.6021 \times 10^{-19}$ coul
Electron vest mass	$m_e = 9.1091 \times 10^{-28}$ gm

THERMODYNAMIC FORMULAE

Charles Law	$P_1 \alpha_1 = P_2 \alpha_2$
Boyles Law	$T_1 \alpha_1 = T_2 \alpha_2$
Perfect Gas Law	$P \alpha = RT \qquad \alpha = V/M$ $R = R^*/m$
VanderWaal Eqn.	$RT = (P + {}^{a}/_{\alpha}2)(\alpha - b)$
Dalton's Law	$P_T = P_1 + P_2 + \ldots . P_n$
Fiest Law of Thermodynamics	$dh = Pd\alpha + c_v\, dT$
Specific Heats (moist air)	$c'_p = (c_{pd} + \omega\, c_{pv})/(1 + w)$ $c'_v = (c_{vd} + \omega\, c_{vv})/(1 + w)$
Dry-adiabatic Lapse Rate	$\Gamma_d = g/c_p$
Hydrostatic Eqn.	$dP = -\rho\, gdZ$
Mixing Ratio	$w = M_v/M_d$ ρ_v/ρ_d $= \varepsilon\, e/(\rho - e)$
Specific Humidity	$q = M_v/M_v + M_d$ $= \rho_v/\rho$ $= w/(1 + w)$
Absolute Humidity	$\rho_v = q\,\rho = {}^{m_v}/_{V}$
Relative Humidity	$RH = (e/e_s) \times 100$ $= (w/w_s) \times 100$
Virtual Temp	$T^* = T[1 + (w/\varepsilon)/(1 + w)]$
Potential Temp	$\theta = T(1000/P)^{2/7}$
Equivalent Temp	$T_e = T \exp^{L}/_{c_p T}$
Equivalent Potential Temp	$\theta_e = \theta \exp^{Lw}/_{c_p T}$
Vapor Pressure of Water Vapor	$e' = {}^{wp}/_{\varepsilon + w}$
Saturation Vapor Pressure	$e'_s = {}^{w_s P}/_{\varepsilon + w_s}$
Dew Point Temp	$T_c = {}^{wP}/_{(e'_s)(\varepsilon + w)}$
Wet Bulb Temp	$\log \frac{L_v(T_w)}{L_v(T)} = \frac{c_{pv} - c_w}{c_{pv}} \log \frac{c_p + c_{pv} w}{c_p + c_{pv} w_s(T_w)}$

DYNAMIC EQUATIONS

Coriolis Parameter	$f = 2\ \omega \sin \phi$
Beta	$\beta = (2\ \omega \cos \phi)/R$
Rossby Phase Speed	$c = u - [\beta L^2/4\pi^2]$
Momentum Equation	$d\bar{v}/dt = -\ \alpha\ \nabla_p + \bar{g} + \bar{f}_r$
First Law of Thermo	$dh/dt = c_p\ dT/dt - \alpha\ dP/dt$
Continuity	$d\rho/dt = -\ \rho\ \nabla \circ \bar{v}$
Gas Law	$P\ \alpha = RT$
Brunt-Väisälä	$t = 2\pi\ /\sqrt{(g/T_o)(\Gamma_d - \Gamma)}$
Poiseuille Flow	$u = (\partial P/\partial x\ 4\mu)(a^2 - r^2)$
Particle Dynamics:	
Stokes Velocity	$w_s = 2(\rho_p - \rho_a)\ g\ r^2/9\mu$
Cunningham Velocity	$w_c = w_s\ (1 + 1.25\ \lambda/r + .42\ \lambda/re^{\frac{-.87r}{\lambda}})$
Rayleigh Scattering	$I_s = I_o\ V^2 \sin^2 \theta/\lambda^4$
Equation of Motion	$\frac{d\bar{v}}{dt} = \bar{b} + \bar{g}_a + \bar{f}_r$
Navier-Stokes Equation	$\frac{du}{dt} = -\ \alpha\ \frac{\partial P}{\partial x} + \nu\ \nabla^2\ \mu$

MICROMET AND RADIATION FORMULAE

Stefan-Boltzmann (Grey Body)	$E = \varepsilon\sigma T^2$
Wein Displacement Law	$\lambda_{max} = 2897\ T^{-1}$
Kirchhoff's Law	$E_\lambda (T) = j_\lambda / K_\lambda$
Plank's Law	$B_\lambda (T) = (c_1 \lambda^{-5}) / e^{c_2/\lambda T} - 1$
	$c_1 = 5.362 \times 10^5$ ly μ^4
	$c_2 = 1.4385 \times 10^4\ \mu°K$
Flux Richardson Number	$R_f = - \dfrac{gH/\rho c_p T}{u_*^2 \dfrac{\partial \bar{u}}{\partial Z}}$
Gradient Richardson Number	$R_i = \dfrac{\dfrac{g}{T}\dfrac{\partial E}{\partial Z}}{(\dfrac{\partial \bar{u}}{\partial Z})^2}$
Monin-Obuklov Length	$L = \dfrac{-u_*^3 T \rho c_p}{Kg Q_u}$
Bulk Richardson Number	$R_b = g \Delta T Z / T \bar{u}^2$
Stability Ratio	$SR = \Delta T / \bar{u}^2$
Sensible Heat Flux	$H = - \rho c_p K_h \Delta T / \Delta Z$
Latent Heat Flux	$LE = - \rho L K_w \Delta q / \Delta Z$
Bowen Ratio	$\beta = H/LE$
Soil Heat Flux	$G = -K \Delta T_{soil} / \Delta Z_{soil}$
Net Radiation	$R_n = (Q + q)(1 - \alpha) - [\varepsilon\sigma (T_{sky}^4 - T_{ground}^4)]$
Energy Balance Equation	$R_n + H + LE + G = 0$
Shear Stress	$\tau = \mu \partial V / \partial Z$
Friction Velocity	$u_* = \sqrt{\tau/\rho}$
Log Wind Law	$\bar{u} = (u_*/K) \ell n\ (Z/Z_o)$

NON-DIMENSIONAL NUMBERS

Reynolds Number	$Re = {}^{Lu}/_{\mu}$
Rossby Number	$Ro = u^2/2\ \omega\ L \sin \alpha$
Froude Number	$F = {}^{u}/_{g\ L}$
Prandtl Number	$P_r = {}^{c_p \mu}/_{K}$
Pecleat Number	$P_e = {}^{LV\rho c_p}/_{K}$
Richardson Number	$Ri = (\frac{\partial \theta}{\partial Z})/T(\frac{\partial \mu}{\partial Z})^2$

STANDARD ATMOSPHERE (NACA), LOWER ATM.

Std. pressure (sea level)	$P_o = 1013.25$ mb $= 29.921$ in Hg
temp (sea level)	$T_o = 15°C = 59°F$
density (sea level)	$\rho_o = 1.2255 \times 10^{-3}$ g cm^{-3} $= .07651$ lb - ft^{-3}
gravity	$g = 980.665$ cms^{-2} $= 32.1740$ ft s^{-2}
lapse rate	$\Gamma_d = .65$ °C cm^{-1} $= .003566$ °F ft^{-1}
gas constant	$R = 29.2745 = 53.3551$
isothermal layer	$T_i = -55$ °C $= -67$ °F

Height Z m	Pressure P mb	Density ρ gm cm^{-3}	Temp T °C
500	955	1.168	11.7
1000	899	1.112	8.5
1500	845	1.059	5.2
2000	795	1.007	2.0
3000	701	0.910	- 4.5
4000	616	0.820	-11.0
5000	540	0.736	-17.5
6000	472	0.660	-24.0
8000	356	0.525	-37.0
10000	264	0.413	-50.0
12000	193	0.311	-56.5
14000	141	0.227	-56.5
16000	103	0.165	-56.5
18000	75	0.121	-56.5

COMPOSITION OF DRY AIR (WMO)

Gas	Symbol	Mol. Fraction (%)	Mol. Wt.	C_p
Nitrogen	N_2	78.09	28.013	.249 cal $°C^{-1}gm^{-1}$
Oxygen	O_2	20.95	31.999	.219
Argon	A	.93	39.948	.125
Carbon Dioxide	CO_2	.03	44.010	.196
Neon	N_e	.0018	20.183	.246
Helium	H_e	.000524	4.003	1.25
Krypton	K_r	.0001	83.80	---
Hydrogen	H_2	.00005	2.016	3.41
Xenon	X_e	.000008	131.30	---
Ozone	O_3	.000001	47.998	---
Radon	R_n	6×10^{-18}	222	---

FLUID PROPERTIES OF DRY AIR

Temp T	Density ρ	Viscosity μ	Kinematic Viscosity ν	Thermal Conductivity K_h	Thermal Diffusivity K_h	Prandtl Number $/K_h$
°C	$gm\text{-}cm^{-3}$	$gm\ cm^{-1}sec^{-1}$	$cm^2\ s^{-1}$	cm sec °C	$cm^2\ s^{-1}$	
- 100	2.04×10^{-3}	1.16×10^{-4}	0.057	1.58×10^{-4}	0.076	0.75
- 50	1.582	1.45	0.092			
0	1.293	1.71	0.132	2.41	.184	0.72
10	1.247	1.76	0.141	2.48	.196	0.72
15	1.225	1.78	0.145	2.51	.202	0.72
20	1.205	1.81	0.150	2.54	.208	0.72
30	1.165	1.86	0.160			
40	1.127	1.90	0.169			
60	1.060	2.00	0.188			
80	1.000	2.09	0.209			
100	0.946	2.18	0.230	3.17	.328	.70
200	0.746	2.58	0.346			
300	0.616	2.95	0.481			
500	0.456	3.58	0.785			
1000	0.277	4.82	1.74	7.6	2.71	.64

ALBEDOS FOR Sw ($\lambda < 4.0\ \mu$)

	%
Water Surfaces	
Ocean	3-7
Bay	3-4
River	6-10
Sea ice	30-40
Snow, fresh	75-95
Snow, old	40-70
Bare Surfaces	
Soil, dark	5-15
Sand, dry	18
Sand, wet	9
Concrete, dry	17-27
Asphalt, dry	5-10
Natural Surfaces	
Forest, green	3-6
Field, dry plowed	20-25
Field, green	10-15
Grass, dry	15-25
Grass, high, dry	31-33
Grass, high, wet	22
Clouds	
Stratus 600-1600' thick	78
Stratocumulous	56-81
Altostratus	39-59
Cirrostratus	44-50
Cumuliform	70-90
Miscellaneous Surfaces	
Bricks, red	45
Glass pane	10
White paint	80
Black paint	2-6
Aluminum foil	85
Galvanized iron, clean	35

USE OF TABLES

$\left(\frac{1000}{P}\right)^{2/7}$: is the basic function involved in calculating potential temperature for dry air; using the form:

$\theta = T\left(\frac{1000}{P}\right)^{2/7}$ the table gives the coefficient which is multiplied times the ambient temperature at a given pressure to obtain potential temperature

Rossby Phase Speed: is that speed (c) which a wave of a given wave length would travel at a given latitude; given in meter/sec. and deg. of long/day; superimposed on (u) the mean zonal flow. Calculations based on formula:

$$C = \frac{\beta L^2}{4\pi^2} \quad \text{where}$$

$\beta = 2\ \Omega \cos \phi$

ϕ = latitude

L = wave length

Latitudinal Properties: many meteorological parameters flucuate with latitude. Those included are:

i) the coriolis parameter = $f = (2\ \Omega \sin \phi)$; where

Ω = angular vel. of earth

$= 7.292116 \times 10^{-5}$ rad sec^{-1}

ϕ = latitude

ii) the beta term = $\beta = (2\ \Omega \cos \phi)/R$; where

R = mean radius of the earth

$= 6.371229 \times 10^{8}$ cm

iii) radial arm of the earth for given latitudes, found from $r = \cos \phi\ R$

USE OF TABLES continued

Inertial Circle: is the radius of curvature at a given latitude for a particle moving at a given speed, where

Radius = u/f

u = velocity of particle expressed in km.

Trig. values: angles in degrees, radians, and corresponding values of sin, cos and tan.

THE SEVENTH POWER OF 1000/PRESSURE

P	.0	.1	.2	.3	.4	.5	.6	.7	.8	.9
0	0.00000	13.69495	11.39852	10.15165	9.35061	8.77307	8.32776	7.96894	7.67064	7.41680
1	7.19664	7.00352	6.83156	6.67710	6.53720	6.40960	6.29249	6.18444	6.08426	5.99100
2	5.90384	5.82211	5.74524	5.67273	5.60417	5.53918	5.47746	5.41871	5.36270	5.30920
3	5.25802	5.20899	5.16196	5.11677	5.07331	5.03147	4.99113	4.95222	4.91463	4.87829
4	4.84313	4.80908	4.77608	4.74408	4.71302	4.68285	4.65354	4.62503	4.59730	4.57029
5	4.54399	4.51835	4.49335	4.46896	4.44516	4.42192	4.39921	4.37702	4.35533	4.33410
6	4.31334	4.29302	4.27312	4.25363	4.23453	4.21582	4.19747	4.17947	4.16182	4.14450
7	4.12749	4.11080	4.09440	4.07830	4.06248	4.04693	4.03164	4.01661	4.00183	3.98729
8	3.97299	3.95891	3.94506	3.93142	3.91799	3.90476	3.89174	3.87890	3.86626	3.85379
9	3.84151	3.82940	3.81746	3.80569	3.79408	3.78262	3.77132	3.76018	3.74917	3.73831
10	3.72759	3.71701	3.70656	3.69625	3.68606	3.67599	3.66605	3.65623	3.64652	3.63693
11	3.62746	3.61809	3.60883	3.59968	3.59062	3.58168	3.57283	3.56408	3.55542	3.54686
12	3.53839	3.53001	3.52172	3.51351	3.50539	3.49736	3.48940	3.48153	3.47374	3.46602
13	3.45838	3.45082	3.44333	3.43591	3.42857	3.42129	3.41409	3.40695	3.39988	3.39287
14	3.38593	3.37905	3.37223	3.36548	3.35878	3.35215	3.34557	3.33906	3.33259	3.32619
15	3.31984	3.31354	3.30730	3.30111	3.29497	3.28888	3.28284	3.27686	3.27092	3.26503
16	3.25918	3.25339	3.24763	3.24193	3.23627	3.23065	3.22508	3.21955	3.21406	3.20862
17	3.20321	3.19785	3.19253	3.18724	3.18200	3.17679	3.17163	3.16650	3.16140	3.15635
18	3.15133	3.14634	3.14139	3.13648	3.13160	3.12675	3.12194	3.11716	3.11242	3.10770
19	3.10302	3.09837	3.09375	3.08916	3.08460	3.08008	3.07558	3.07111	3.06667	3.06226
20	3.05788	3.05352	3.04920	3.04490	3.04062	3.03638	3.03216	3.02797	3.02380	3.01966
21	3.01555	3.01146	3.00739	3.00335	2.99933	2.99534	2.99137	2.98743	2.98350	2.97961
22	2.97573	2.97188	2.96805	2.96424	2.96045	2.95668	2.95294	2.94922	2.94552	2.94184
23	2.93818	2.93454	2.93092	2.92732	2.92374	2.92018	2.91664	2.91311	2.90961	2.90613
24	2.90266	2.89922	2.89579	2.89238	2.88899	2.88561	2.88226	2.87892	2.87560	2.87229
25	2.86901	2.86574	2.86248	2.85924	2.85602	2.85282	2.84963	2.84646	2.84330	2.84016
26	2.83704	2.83393	2.83083	2.82775	2.82469	2.82164	2.81860	2.81558	2.81258	2.80959
27	2.80661	2.80365	2.80070	2.79776	2.79484	2.79193	2.78904	2.78616	2.78329	2.78044
28	2.77760	2.77477	2.77195	2.76915	2.76636	2.76359	2.76082	2.75807	2.75533	2.75260
29	2.74989	2.74718	2.74449	2.74181	2.73915	2.73649	2.73384	2.73121	2.72859	2.72598
30	2.72338	2.72079	2.71821	2.71565	2.71309	2.71055	2.70801	2.70549	2.70298	2.70048
31	2.69798	2.69550	2.69303	2.69057	2.68812	2.68568	2.68325	2.68083	2.67842	2.67601
32	2.67362	2.67124	2.66887	2.66650	2.66415	2.66180	2.65947	2.65714	2.65483	2.65252
33	2.65022	2.64793	2.64565	2.64338	2.64111	2.63886	2.63661	2.63437	2.63214	2.62992
34	2.62771	2.62551	2.62331	2.62112	2.61894	2.61677	2.61461	2.61245	2.61031	2.60817
35	2.60604	2.60391	2.60180	2.59969	2.59759	2.59550	2.59341	2.59133	2.58926	2.58720
36	2.58515	2.58310	2.58106	2.57902	2.57700	2.57498	2.57297	2.57096	2.56896	2.56697
37	2.56499	2.56301	2.56104	2.55908	2.55712	2.55517	2.55323	2.55129	2.54936	2.54743
38	2.54552	2.54361	2.54170	2.53980	2.53791	2.53603	2.53415	2.53228	2.53041	2.52855
39	2.52670	2.52485	2.52301	2.52117	2.51934	2.51752	2.51570	2.51389	2.51208	2.51028
40	2.50848	2.50670	2.50491	2.50313	2.50136	2.49960	2.49784	2.49608	2.49433	2.49259
41	2.49085	2.48912	2.48739	2.48567	2.48395	2.48224	2.48053	2.47883	2.47713	2.47544
42	2.47376	2.47208	2.47040	2.46873	2.46707	2.46541	2.46375	2.46210	2.46046	2.45882
43	2.45718	2.45555	2.45393	2.45231	2.45069	2.44908	2.44747	2.44587	2.44428	2.44268
44	2.44110	2.43951	2.43794	2.43636	2.43479	2.43323	2.43167	2.43011	2.42856	2.42702
45	2.42547	2.42394	2.42240	2.42087	2.41935	2.41783	2.41631	2.41480	2.41329	2.41179
46	2.41029	2.40879	2.40730	2.40582	2.40433	2.40286	2.40138	2.39991	2.39844	2.39698
47	2.39552	2.39407	2.39262	2.39117	2.38973	2.38829	2.38686	2.38543	2.38400	2.38258
48	2.38116	2.37974	2.37833	2.37692	2.37552	2.37412	2.37272	2.37133	2.36994	2.36855
49	2.36717	2.36579	2.36442	2.36305	2.36168	2.36031	2.35895	2.35760	2.35624	2.35489
50	2.35355	2.35220	2.35086	2.34953	2.34819	2.34687	2.34554	2.34422	2.34290	2.34158
51	2.34027	2.33896	2.33765	2.33635	2.33505	2.33375	2.33246	2.33117	2.32988	2.32860
52	2.32732	2.32604	2.32477	2.32350	2.32223	2.32097	2.31970	2.31845	2.31719	2.31594
53	2.31469	2.31344	2.31220	2.31096	2.30972	2.30849	2.30726	2.30603	2.30480	2.30358
54	2.30236	2.30114	2.29993	2.29872	2.29751	2.29630	2.29510	2.29390	2.29271	2.29151
55	2.29032	2.28913	2.28795	2.28676	2.28558	2.28441	2.28323	2.28206	2.28089	2.27972
56	2.27856	2.27740	2.27624	2.27508	2.27393	2.27278	2.27163	2.27049	2.26934	2.26820

57	2.26707	2.26593	2.26480	2.26367	2.26254	2.26142	2.26029	2.25917	2.25806	2.25694
58	2.25583	2.25472	2.25361	2.25251	2.25140	2.25030	2.24921	2.24811	2.24702	2.24593
59	2.24484	2.24375	2.24267	2.24159	2.24051	2.23943	2.23836	2.23729	2.23622	2.23515
60	2.23408	2.23302	2.23196	2.23090	2.22985	2.22879	2.22774	2.22669	2.22565	2.22460
61	2.22356	2.22252	2.22148	2.22044	2.21941	2.21838	2.21735	2.21632	2.21530	2.21427
62	2.21325	2.21223	2.21122	2.21020	2.20919	2.20818	2.20717	2.20616	2.20516	2.20416
63	2.20316	2.20216	2.20116	2.20017	2.19918	2.19819	2.19720	2.19621	2.19523	2.19425
64	2.19327	2.19229	2.19131	2.19034	2.18937	2.18840	2.18743	2.18646	2.18550	2.18453
65	2.18357	2.18261	2.18166	2.18070	2.17975	2.17880	2.17785	2.17690	2.17595	2.17501
66	2.17407	2.17313	2.17219	2.17125	2.17032	2.16939	2.16845	2.16752	2.16660	2.16567
67	2.16475	2.16383	2.16290	2.16199	2.16107	2.16015	2.15924	2.15833	2.15742	2.15651
68	2.15560	2.15470	2.15380	2.15289	2.15199	2.15110	2.15020	2.14931	2.14841	2.14752
69	2.14663	2.14574	2.14486	2.14397	2.14309	2.14221	2.14133	2.14045	2.13957	2.13870
70	2.13782	2.13695	2.13608	2.13521	2.13435	2.13348	2.13262	2.13176	2.13089	2.13004
71	2.12918	2.12832	2.12747	2.12661	2.12576	2.12491	2.12406	2.12322	2.12237	2.12153
72	2.12069	2.11985	2.11901	2.11817	2.11733	2.11650	2.11566	2.11483	2.11400	2.11317
73	2.11235	2.11152	2.11069	2.10987	2.10905	2.10823	2.10741	2.10659	2.10578	2.10496
74	2.10415	2.10334	2.10253	2.10172	2.10091	2.10011	2.09930	2.09850	2.09770	2.09689
75	2.09610	2.09530	2.09450	2.09371	2.09291	2.09212	2.09133	2.09054	2.08975	2.08896
76	2.08818	2.08739	2.08661	2.08583	2.08505	2.08427	2.08349	2.08272	2.08194	2.08117
77	2.08039	2.07962	2.07885	2.07808	2.07732	2.07655	2.07578	2.07502	2.07426	2.07350
78	2.07274	2.07198	2.07122	2.07047	2.06971	2.06896	2.06820	2.06745	2.06670	2.06595
79	2.06521	2.06446	2.06372	2.06297	2.06223	2.06149	2.06075	2.06001	2.05927	2.05853
80	2.05780	2.05706	2.05633	2.05560	2.05487	2.05414	2.05341	2.05268	2.05196	2.05123
81	2.05051	2.04979	2.04906	2.04834	2.04762	2.04691	2.04619	2.04547	2.04476	2.04404
82	2.04333	2.04262	2.04191	2.04120	2.04049	2.03979	2.03908	2.03838	2.03767	2.03697
83	2.03627	2.03557	2.03487	2.03417	2.03347	2.03278	2.03208	2.03139	2.03069	2.03000
84	2.02931	2.02862	2.02793	2.02725	2.02656	2.02587	2.02519	2.02451	2.02382	2.02314
85	2.02246	2.02178	2.02110	2.02043	2.01975	2.01908	2.01840	2.01773	2.01706	2.01638
86	2.01571	2.01505	2.01438	2.01371	2.01304	2.01238	2.01171	2.01105	2.01039	2.00973
87	2.00907	2.00841	2.00775	2.00709	2.00644	2.00578	2.00513	2.00447	2.00382	2.00317
88	2.00252	2.00187	2.00122	2.00057	1.99992	1.99928	1.99863	1.99799	1.99735	1.99670
89	1.99606	1.99542	1.99478	1.99414	1.99351	1.99287	1.99224	1.99160	1.99097	1.99033
90	1.98970	1.98907	1.98844	1.98781	1.98718	1.98655	1.98593	1.98530	1.98468	1.98405
91	1.98343	1.98281	1.98219	1.98157	1.98095	1.98033	1.97971	1.97909	1.97848	1.97786
92	1.97725	1.97663	1.97602	1.97541	1.97480	1.97419	1.97358	1.97297	1.97236	1.97175
93	1.97115	1.97054	1.96994	1.96933	1.96873	1.96813	1.96753	1.96693	1.96633	1.96573
94	1.96513	1.96454	1.96394	1.96335	1.96275	1.96216	1.96156	1.96097	1.96038	1.95979
95	1.95920	1.95861	1.95802	1.95744	1.95685	1.95626	1.95568	1.95510	1.95451	1.95393
96	1.95335	1.95277	1.95219	1.95161	1.95103	1.95045	1.94987	1.94930	1.94872	1.94815
97	1.94757	1.94700	1.94643	1.94586	1.94528	1.94471	1.94414	1.94358	1.94301	1.94244
98	1.94187	1.94131	1.94074	1.94018	1.93962	1.93905	1.93849	1.93793	1.93737	1.93681
99	1.93625	1.93569	1.93513	1.93458	1.93402	1.93346	1.93291	1.93236	1.93180	1.93125
100	1.93070	1.93015	1.92960	1.92905	1.92850	1.92795	1.92740	1.92685	1.92631	1.92576
101	1.92522	1.92467	1.92413	1.92359	1.92304	1.92250	1.92196	1.92142	1.92088	1.92034
102	1.91980	1.91927	1.91873	1.91819	1.91766	1.91712	1.91659	1.91606	1.91552	1.91499
103	1.91446	1.91393	1.91340	1.91287	1.91234	1.91181	1.91129	1.91076	1.91023	1.90971
104	1.90918	1.90866	1.90814	1.90761	1.90709	1.90657	1.90605	1.90553	1.90501	1.90449
105	1.90397	1.90345	1.90294	1.90242	1.90190	1.90139	1.90087	1.90036	1.89985	1.89933
106	1.89882	1.89831	1.89780	1.89729	1.89678	1.89627	1.89576	1.89525	1.89475	1.89424
107	1.89373	1.89323	1.89272	1.89222	1.89172	1.89121	1.89071	1.89021	1.88971	1.88921
108	1.88871	1.88821	1.88771	1.88721	1.88671	1.88622	1.88572	1.88522	1.88473	1.88423
109	1.88374	1.88325	1.88275	1.88226	1.88177	1.88128	1.88079	1.88030	1.87981	1.87932
110	1.87883	1.87834	1.87786	1.87737	1.87688	1.87640	1.87591	1.87543	1.87495	1.87446
111	1.87398	1.87350	1.87302	1.87254	1.87205	1.87157	1.87110	1.87062	1.87014	1.86966
112	1.86918	1.86871	1.86823	1.86776	1.86728	1.86681	1.86633	1.86586	1.86539	1.86491
113	1.86444	1.86397	1.86350	1.86303	1.86256	1.86209	1.86162	1.86116	1.86069	1.86022
114	1.85974	1.85929	1.85882	1.85836	1.85789	1.85743	1.85697	1.85651	1.85604	1.85558
115	1.85512	1.85466	1.85420	1.85374	1.85328	1.85282	1.85236	1.85191	1.85145	1.85099
116	1.85054	1.85008	1.84963	1.84917	1.84872	1.84826	1.84781	1.84736	1.84691	1.84645

117	1.84600	1.84555	1.84510	1.84465	1.84420	1.84376	1.84331	1.84286	1.84241	1.84197
118	1.84152	1.84107	1.84063	1.84019	1.83974	1.83930	1.83885	1.83841	1.83797	1.83753
119	1.83709	1.83664	1.83620	1.83576	1.83533	1.83489	1.83445	1.83401	1.83357	1.83314
120	1.83270	1.83226	1.83183	1.83139	1.83096	1.83052	1.83009	1.82966	1.82922	1.82879
121	1.82836	1.82793	1.82750	1.82707	1.82664	1.82621	1.82578	1.82535	1.82492	1.82449
122	1.82406	1.82364	1.82321	1.82278	1.82236	1.82193	1.82151	1.82108	1.82066	1.82024
123	1.81981	1.81939	1.81897	1.81855	1.81813	1.81771	1.81729	1.81687	1.81645	1.81603
124	1.81561	1.81519	1.81477	1.81436	1.81394	1.81352	1.81311	1.81269	1.81228	1.81186
125	1.81145	1.81103	1.81062	1.81021	1.80979	1.80938	1.80897	1.80856	1.80815	1.80774
126	1.80733	1.80692	1.80651	1.80610	1.80569	1.80528	1.80488	1.80447	1.80406	1.80366
127	1.80325	1.80285	1.80244	1.80204	1.80163	1.80123	1.80082	1.80042	1.80002	1.79962
128	1.79921	1.79881	1.79841	1.79801	1.79761	1.79721	1.79681	1.79641	1.79601	1.79562
129	1.79522	1.79482	1.79442	1.79403	1.79363	1.79324	1.79284	1.79244	1.79205	1.79166
130	1.79126	1.79087	1.79048	1.79008	1.78969	1.78930	1.78891	1.78852	1.78812	1.78773
131	1.78734	1.78695	1.78657	1.78618	1.78579	1.78540	1.78501	1.78462	1.78424	1.78385
132	1.78347	1.78308	1.78269	1.78231	1.78192	1.78154	1.78116	1.78077	1.78039	1.78001
133	1.77963	1.77924	1.77886	1.77848	1.77810	1.77772	1.77734	1.77696	1.77658	1.77620
134	1.77582	1.77544	1.77506	1.77468	1.77431	1.77393	1.77355	1.77318	1.77280	1.77243
135	1.77205	1.77168	1.77130	1.77093	1.77055	1.77018	1.76981	1.76943	1.76906	1.76869
136	1.76832	1.76795	1.76758	1.76720	1.76683	1.76646	1.76610	1.76573	1.76536	1.76499
137	1.76462	1.76425	1.76388	1.76352	1.76315	1.76278	1.76242	1.76205	1.76169	1.76132
138	1.76096	1.76059	1.76023	1.75987	1.75950	1.75914	1.75878	1.75841	1.75805	1.75769
139	1.75733	1.75697	1.75661	1.75625	1.75589	1.75553	1.75517	1.75481	1.75445	1.75409
140	1.75373	1.75338	1.75302	1.75266	1.75230	1.75195	1.75159	1.75124	1.75088	1.75052
141	1.75017	1.74982	1.74946	1.74911	1.74875	1.74840	1.74805	1.74770	1.74734	1.74699
142	1.74664	1.74629	1.74594	1.74559	1.74524	1.74489	1.74454	1.74419	1.74384	1.74349
143	1.74314	1.74279	1.74245	1.74210	1.74175	1.74140	1.74106	1.74071	1.74036	1.74002
144	1.73967	1.73933	1.73898	1.73864	1.73830	1.73795	1.73761	1.73727	1.73692	1.73658
145	1.73624	1.73590	1.73555	1.73521	1.73487	1.73453	1.73419	1.73385	1.73351	1.73317
146	1.73283	1.73249	1.73215	1.73182	1.73148	1.73114	1.73080	1.73047	1.73013	1.72979
147	1.72946	1.72912	1.72878	1.72845	1.72811	1.72778	1.72744	1.72711	1.72678	1.72644
148	1.72611	1.72578	1.72544	1.72511	1.72478	1.72445	1.72411	1.72378	1.72345	1.72312
149	1.72279	1.72246	1.72213	1.72180	1.72147	1.72114	1.72081	1.72049	1.72016	1.71983
150	1.71950	1.71917	1.71885	1.71852	1.71819	1.71787	1.71754	1.71722	1.71689	1.71656
151	1.71624	1.71592	1.71559	1.71527	1.71494	1.71462	1.71430	1.71397	1.71365	1.71333
152	1.71301	1.71268	1.71236	1.71204	1.71172	1.71140	1.71108	1.71076	1.71044	1.71012
153	1.70980	1.70948	1.70916	1.70884	1.70852	1.70821	1.70789	1.70757	1.70725	1.70694
154	1.70662	1.70630	1.70599	1.70567	1.70536	1.70504	1.70473	1.70441	1.70410	1.70378
155	1.70347	1.70315	1.70284	1.70253	1.70221	1.70190	1.70159	1.70128	1.70096	1.70065
156	1.70034	1.70003	1.69972	1.69941	1.69910	1.69879	1.69848	1.69817	1.69786	1.69755
157	1.69724	1.69693	1.69662	1.69631	1.69601	1.69570	1.69539	1.69508	1.69478	1.69447
158	1.69416	1.69386	1.69355	1.69324	1.69294	1.69263	1.69233	1.69202	1.69172	1.69142
159	1.69111	1.69081	1.69050	1.69020	1.68990	1.68960	1.68929	1.68899	1.68869	1.68839
160	1.68808	1.68778	1.68748	1.68718	1.68688	1.68658	1.68628	1.68598	1.68568	1.68538
161	1.68508	1.68478	1.68448	1.68419	1.68389	1.68359	1.68329	1.68300	1.68270	1.68240
162	1.68210	1.68181	1.68151	1.68122	1.68092	1.68062	1.68033	1.68003	1.67974	1.67944
163	1.67915	1.67885	1.67856	1.67827	1.67797	1.67768	1.67739	1.67709	1.67680	1.67651
164	1.67622	1.67593	1.67563	1.67534	1.67505	1.67476	1.67447	1.67418	1.67389	1.67360
165	1.67331	1.67302	1.67273	1.67244	1.67215	1.67186	1.67157	1.67129	1.67100	1.67071
166	1.67042	1.67013	1.66985	1.66956	1.66927	1.66899	1.66870	1.66842	1.66813	1.66784
167	1.66756	1.66727	1.66699	1.66670	1.66642	1.66613	1.66585	1.66557	1.66528	1.66500
168	1.66472	1.66443	1.66415	1.66387	1.66359	1.66330	1.66302	1.66274	1.66246	1.66218
169	1.66190	1.66161	1.66133	1.66105	1.66077	1.66049	1.66021	1.65993	1.65965	1.65938
170	1.65910	1.65882	1.65854	1.65826	1.65798	1.65771	1.65743	1.65715	1.65687	1.65660
171	1.65632	1.65604	1.65577	1.65549	1.65521	1.65494	1.65466	1.65439	1.65411	1.65384
172	1.65356	1.65329	1.65301	1.65274	1.65246	1.65219	1.65192	1.65164	1.65137	1.65110
173	1.65083	1.65055	1.65028	1.65001	1.64974	1.64946	1.64919	1.64892	1.64865	1.64838
174	1.64811	1.64784	1.64757	1.64730	1.64703	1.64676	1.64649	1.64622	1.64595	1.64568
175	1.64541	1.64514	1.64488	1.64461	1.64434	1.64407	1.64380	1.64354	1.64327	1.64300
176	1.64274	1.64247	1.64220	1.64194	1.64167	1.64141	1.64114	1.64087	1.64061	1.64034

177	1.64008	1.63981	1.63955	1.63929	1.63902	1.63876	1.63849	1.63823	1.63797	1.63770
178	1.63744	1.63718	1.63692	1.63665	1.63639	1.63613	1.63587	1.63561	1.63534	1.63508
179	1.63482	1.63456	1.63430	1.63404	1.63378	1.63352	1.63326	1.63300	1.63274	1.63248
180	1.63222	1.63196	1.63170	1.63145	1.63119	1.63093	1.63067	1.63041	1.63016	1.62990
181	1.62964	1.62938	1.62913	1.62887	1.62861	1.62836	1.62810	1.62784	1.62759	1.62733
182	1.62708	1.62682	1.62657	1.62631	1.62606	1.62580	1.62555	1.62529	1.62504	1.62479
183	1.62453	1.62428	1.62403	1.62377	1.62352	1.62327	1.62301	1.62276	1.62251	1.62226
184	1.62200	1.62175	1.62150	1.62125	1.62100	1.62075	1.62050	1.62025	1.62000	1.61974
185	1.61949	1.61924	1.61899	1.61875	1.61850	1.61825	1.61800	1.61775	1.61750	1.61725
186	1.61700	1.61675	1.61651	1.61626	1.61601	1.61576	1.61551	1.61527	1.61502	1.61477
187	1.61453	1.61428	1.61403	1.61379	1.61354	1.61330	1.61305	1.61280	1.61256	1.61231
188	1.61207	1.61182	1.61158	1.61133	1.61109	1.61085	1.61060	1.61036	1.61011	1.60987
189	1.60963	1.60938	1.60914	1.60890	1.60865	1.60841	1.60817	1.60793	1.60769	1.60744
190	1.60720	1.60696	1.60672	1.60648	1.60624	1.60600	1.60575	1.60551	1.60527	1.60503
191	1.60479	1.60455	1.60431	1.60407	1.60383	1.60359	1.60336	1.60312	1.60288	1.60264
192	1.60240	1.60216	1.60192	1.60169	1.60145	1.60121	1.60097	1.60074	1.60050	1.60026
193	1.60002	1.59979	1.59955	1.59931	1.59908	1.59884	1.59861	1.59837	1.59813	1.59790
194	1.59766	1.59743	1.59719	1.59696	1.59672	1.59649	1.59625	1.59602	1.59579	1.59555
195	1.59532	1.59508	1.59485	1.59462	1.59438	1.59415	1.59392	1.59369	1.59345	1.59322
196	1.59299	1.59276	1.59252	1.59229	1.59206	1.59183	1.59160	1.59137	1.59114	1.59090
197	1.59067	1.59044	1.59021	1.58998	1.58975	1.58952	1.58929	1.58906	1.58883	1.58860
198	1.58837	1.58814	1.58792	1.58769	1.58746	1.58723	1.58700	1.58677	1.58655	1.58632
199	1.58609	1.58586	1.58563	1.58541	1.58518	1.58495	1.58473	1.58450	1.58427	1.58405
200	1.58382	1.58359	1.58337	1.58314	1.58292	1.58269	1.58246	1.58224	1.58201	1.58179
201	1.58156	1.58134	1.58111	1.58089	1.58067	1.58044	1.58022	1.57999	1.57977	1.57955
202	1.57932	1.57910	1.57888	1.57865	1.57843	1.57821	1.57799	1.57776	1.57754	1.57732
203	1.57710	1.57687	1.57665	1.57643	1.57621	1.57599	1.57577	1.57555	1.57533	1.57510
204	1.57488	1.57466	1.57444	1.57422	1.57400	1.57378	1.57356	1.57334	1.57312	1.57290
205	1.57269	1.57247	1.57225	1.57203	1.57181	1.57159	1.57137	1.57115	1.57094	1.57072
206	1.57050	1.57028	1.57006	1.56985	1.56963	1.56941	1.56920	1.56898	1.56876	1.56855
207	1.56833	1.56811	1.56790	1.56768	1.56746	1.56725	1.56703	1.56682	1.56660	1.56639
208	1.56617	1.56596	1.56574	1.56553	1.56531	1.56510	1.56488	1.56467	1.56445	1.56424
209	1.56403	1.56381	1.56360	1.56338	1.56317	1.56296	1.56275	1.56253	1.56232	1.56211
210	1.56189	1.56168	1.56147	1.56126	1.56105	1.56083	1.56062	1.56041	1.56020	1.55999
211	1.55979	1.55958	1.55935	1.55914	1.55893	1.55872	1.55851	1.55830	1.55809	1.55788
212	1.55767	1.55746	1.55725	1.55704	1.55683	1.55662	1.55641	1.55620	1.55599	1.55579
213	1.55558	1.55537	1.55516	1.55495	1.55474	1.55454	1.55433	1.55412	1.55391	1.55370
214	1.55350	1.55329	1.55308	1.55288	1.55267	1.55246	1.55225	1.55205	1.55184	1.55164
215	1.55143	1.55122	1.55102	1.55081	1.55061	1.55040	1.55019	1.54999	1.54978	1.54958
216	1.54937	1.54917	1.54896	1.54876	1.54855	1.54835	1.54815	1.54794	1.54774	1.54753
217	1.54733	1.54713	1.54692	1.54672	1.54652	1.54631	1.54611	1.54591	1.54570	1.54550
218	1.54530	1.54510	1.54489	1.54469	1.54449	1.54429	1.54409	1.54388	1.54368	1.54348
219	1.54328	1.54308	1.54288	1.54268	1.54247	1.54227	1.54207	1.54187	1.54167	1.54147
220	1.54127	1.54107	1.54087	1.54067	1.54047	1.54027	1.54007	1.53987	1.53967	1.53946
221	1.53928	1.53908	1.53888	1.53868	1.53848	1.53828	1.53808	1.53789	1.53769	1.53749
222	1.53729	1.53709	1.53690	1.53670	1.53650	1.53630	1.53611	1.53591	1.53571	1.53552
223	1.53532	1.53512	1.53493	1.53473	1.53453	1.53434	1.53414	1.53394	1.53375	1.53355
224	1.53336	1.53316	1.53297	1.53277	1.53258	1.53238	1.53219	1.53199	1.53180	1.53160
225	1.53141	1.53121	1.53102	1.53082	1.53063	1.53044	1.53024	1.53005	1.52986	1.52966
226	1.52947	1.52927	1.52908	1.52889	1.52870	1.52850	1.52831	1.52812	1.52792	1.52773
227	1.52754	1.52735	1.52716	1.52696	1.52677	1.52658	1.52639	1.52620	1.52601	1.52581
228	1.52562	1.52543	1.52524	1.52505	1.52486	1.52467	1.52448	1.52429	1.52410	1.52391
229	1.52372	1.52353	1.52334	1.52315	1.52296	1.52277	1.52258	1.52239	1.52220	1.52201
230	1.52182	1.52163	1.52144	1.52125	1.52107	1.52088	1.52069	1.52050	1.52031	1.52012
231	1.51994	1.51975	1.51956	1.51937	1.51918	1.51900	1.51881	1.51862	1.51843	1.51825
232	1.51806	1.51787	1.51769	1.51750	1.51731	1.51713	1.51694	1.51675	1.51657	1.51638
233	1.51620	1.51601	1.51582	1.51564	1.51545	1.51527	1.51508	1.51490	1.51471	1.51453
234	1.51434	1.51416	1.51397	1.51379	1.51360	1.51342	1.51323	1.51305	1.51287	1.51268
235	1.51250	1.51231	1.51213	1.51195	1.51176	1.51158	1.51140	1.51121	1.51103	1.51085
236	1.51066	1.51048	1.51030	1.51012	1.50993	1.50975	1.50957	1.50939	1.50920	1.50902

237	1.50887	1.50869	1.50849	1.50830	1.50811	1.50793	1.50775	1.50757	1.50739	1.50721
238	1.50703	1.50685	1.50666	1.50648	1.50630	1.50612	1.50594	1.50576	1.50558	1.50540
239	1.50522	1.50504	1.50486	1.50468	1.50450	1.50432	1.50414	1.50396	1.50379	1.50361
240	1.50343	1.50325	1.50307	1.50289	1.50271	1.50253	1.50236	1.50218	1.50200	1.50182
241	1.50164	1.50146	1.50129	1.50111	1.50093	1.50075	1.50058	1.50040	1.50022	1.50004
242	1.49987	1.49969	1.49951	1.49934	1.49916	1.49898	1.49881	1.49863	1.49845	1.49828
243	1.49810	1.49792	1.49775	1.49757	1.49740	1.49722	1.49705	1.49687	1.49669	1.49652
244	1.49634	1.49617	1.49599	1.49582	1.49564	1.49547	1.49529	1.49512	1.49495	1.49477
245	1.49460	1.49442	1.49425	1.49407	1.49390	1.49373	1.49355	1.49338	1.49321	1.49303
246	1.49286	1.49268	1.49251	1.49234	1.49217	1.49199	1.49182	1.49165	1.49147	1.49130
247	1.49113	1.49096	1.49078	1.49061	1.49044	1.49027	1.49010	1.48992	1.48975	1.48958
248	1.48941	1.48924	1.48907	1.48889	1.48872	1.48855	1.48838	1.48821	1.48804	1.48787
249	1.48770	1.48753	1.48736	1.48719	1.48701	1.48684	1.48667	1.48650	1.48633	1.48616
250	1.48599	1.48582	1.48565	1.48549	1.48532	1.48515	1.48498	1.48481	1.48464	1.48447
251	1.48430	1.48413	1.48396	1.48379	1.48363	1.48346	1.48329	1.48312	1.48295	1.48278
252	1.48262	1.48245	1.48228	1.48211	1.48194	1.48178	1.48161	1.48144	1.48127	1.48111
253	1.48094	1.48077	1.48060	1.48044	1.48027	1.48010	1.47994	1.47977	1.47960	1.47944
254	1.47927	1.47910	1.47894	1.47877	1.47861	1.47844	1.47827	1.47811	1.47794	1.47778
255	1.47761	1.47744	1.47728	1.47711	1.47695	1.47678	1.47662	1.47645	1.47629	1.47612
256	1.47596	1.47579	1.47563	1.47547	1.47530	1.47514	1.47497	1.47481	1.47464	1.47448
257	1.47432	1.47415	1.47399	1.47382	1.47366	1.47350	1.47333	1.47317	1.47301	1.47284
258	1.47268	1.47252	1.47235	1.47219	1.47203	1.47187	1.47170	1.47154	1.47138	1.47122
259	1.47105	1.47089	1.47073	1.47057	1.47041	1.47024	1.47008	1.46992	1.46976	1.46960
260	1.46944	1.46927	1.46911	1.46895	1.46879	1.46863	1.46847	1.46831	1.46815	1.46799
261	1.46783	1.46766	1.46750	1.46734	1.46718	1.46702	1.46686	1.46670	1.46654	1.46638
262	1.46622	1.46606	1.46590	1.46574	1.46558	1.46542	1.46526	1.46510	1.46495	1.46479
263	1.46463	1.46447	1.46431	1.46415	1.46399	1.46383	1.46367	1.46351	1.46336	1.46320
264	1.46304	1.46288	1.46272	1.46256	1.46241	1.46225	1.46209	1.46193	1.46178	1.46162
265	1.46146	1.46130	1.46114	1.46099	1.46083	1.46067	1.46052	1.46036	1.46020	1.46004
266	1.45989	1.45973	1.45957	1.45942	1.45926	1.45910	1.45895	1.45879	1.45864	1.45848
267	1.45832	1.45817	1.45801	1.45786	1.45770	1.45754	1.45739	1.45723	1.45708	1.45692
268	1.45677	1.45661	1.45646	1.45630	1.45615	1.45599	1.45584	1.45568	1.45553	1.45537
269	1.45522	1.45506	1.45491	1.45475	1.45460	1.45445	1.45429	1.45414	1.45398	1.45383
270	1.45368	1.45352	1.45337	1.45321	1.45306	1.45291	1.45275	1.45260	1.45245	1.45229
271	1.45214	1.45199	1.45183	1.45168	1.45153	1.45138	1.45122	1.45107	1.45092	1.45077
272	1.45061	1.45046	1.45031	1.45016	1.45000	1.44985	1.44970	1.44955	1.44940	1.44925
273	1.44909	1.44894	1.44879	1.44864	1.44849	1.44834	1.44818	1.44803	1.44788	1.44773
274	1.44758	1.44743	1.44728	1.44713	1.44698	1.44683	1.44668	1.44653	1.44638	1.44622
275	1.44607	1.44592	1.44577	1.44562	1.44547	1.44532	1.44517	1.44502	1.44487	1.44473
276	1.44458	1.44443	1.44428	1.44413	1.44398	1.44383	1.44368	1.44353	1.44338	1.44323
277	1.44308	1.44293	1.44279	1.44264	1.44249	1.44234	1.44219	1.44204	1.44190	1.44175
278	1.44160	1.44145	1.44130	1.44115	1.44101	1.44086	1.44071	1.44056	1.44042	1.44027
279	1.44012	1.43997	1.43983	1.43968	1.43953	1.43938	1.43924	1.43909	1.43894	1.43880
280	1.43865	1.43850	1.43836	1.43821	1.43806	1.43792	1.43777	1.43762	1.43748	1.43733
281	1.43719	1.43704	1.43689	1.43675	1.43660	1.43645	1.43631	1.43616	1.43602	1.43587
282	1.43573	1.43558	1.43544	1.43529	1.43515	1.43500	1.43485	1.43471	1.43456	1.43442
283	1.43427	1.43413	1.43399	1.43384	1.43370	1.43355	1.43341	1.43326	1.43312	1.43297
284	1.43283	1.43269	1.43254	1.43240	1.43225	1.43211	1.43197	1.43182	1.43168	1.43154
285	1.43139	1.43125	1.43111	1.43096	1.43082	1.43068	1.43053	1.43039	1.43025	1.43010
286	1.42996	1.42982	1.42967	1.42953	1.42939	1.42925	1.42910	1.42896	1.42882	1.42868
287	1.42854	1.42839	1.42825	1.42811	1.42797	1.42782	1.42768	1.42754	1.42740	1.42726
288	1.42712	1.42697	1.42683	1.42669	1.42655	1.42641	1.42627	1.42613	1.42599	1.42584
289	1.42570	1.42556	1.42542	1.42528	1.42514	1.42500	1.42486	1.42472	1.42458	1.42444
290	1.42430	1.42416	1.42402	1.42388	1.42374	1.42360	1.42346	1.42332	1.42318	1.42304
291	1.42290	1.42276	1.42262	1.42248	1.42234	1.42220	1.42206	1.42192	1.42178	1.42164
292	1.42150	1.42136	1.42122	1.42109	1.42095	1.42081	1.42067	1.42053	1.42039	1.42025
293	1.42012	1.41998	1.41984	1.41970	1.41956	1.41942	1.41929	1.41915	1.41901	1.41887
294	1.41873	1.41860	1.41846	1.41832	1.41818	1.41804	1.41791	1.41777	1.41763	1.41749
295	1.41736	1.41722	1.41708	1.41695	1.41681	1.41667	1.41653	1.41640	1.41626	1.41612
296	1.41599	1.41585	1.41571	1.41558	1.41544	1.41531	1.41517	1.41503	1.41490	1.41476

297	1.41462	1.41449	1.41435	1.41422	1.41408	1.41394	1.41381	1.41367	1.41354	1.41340
298	1.41327	1.41313	1.41300	1.41286	1.41272	1.41259	1.41245	1.41232	1.41218	1.41205
299	1.41191	1.41178	1.41164	1.41151	1.41137	1.41124	1.41111	1.41097	1.41084	1.41070
300	1.41057	1.41043	1.41030	1.41016	1.41003	1.40990	1.40976	1.40963	1.40949	1.40936
301	1.40923	1.40909	1.40896	1.40883	1.40869	1.40856	1.40843	1.40829	1.40816	1.40803
302	1.40789	1.40776	1.40763	1.40749	1.40736	1.40723	1.40709	1.40696	1.40683	1.40670
303	1.40656	1.40643	1.40630	1.40617	1.40603	1.40590	1.40577	1.40564	1.40550	1.40537
304	1.40524	1.40511	1.40498	1.40484	1.40471	1.40458	1.40445	1.40432	1.40418	1.40405
305	1.40392	1.40379	1.40366	1.40353	1.40340	1.40326	1.40313	1.40300	1.40287	1.40274
306	1.40261	1.40248	1.40235	1.40222	1.40209	1.40196	1.40182	1.40169	1.40156	1.40143
307	1.40130	1.40117	1.40104	1.40091	1.40078	1.40065	1.40052	1.40039	1.40026	1.40013
308	1.40000	1.39987	1.39974	1.39961	1.39948	1.39935	1.39922	1.39909	1.39896	1.39883
309	1.39871	1.39858	1.39845	1.39832	1.39819	1.39806	1.39793	1.39780	1.39767	1.39754
310	1.39741	1.39729	1.39716	1.39703	1.39690	1.39677	1.39664	1.39651	1.39639	1.39626
311	1.39613	1.39600	1.39587	1.39574	1.39562	1.39549	1.39536	1.39523	1.39510	1.39498
312	1.39485	1.39472	1.39459	1.39447	1.39434	1.39421	1.39408	1.39396	1.39383	1.39370
313	1.39357	1.39345	1.39332	1.39319	1.39307	1.39294	1.39281	1.39269	1.39256	1.39243
314	1.39231	1.39218	1.39205	1.39193	1.39180	1.39167	1.39155	1.39142	1.39129	1.39117
315	1.39104	1.39091	1.39079	1.39066	1.39054	1.39041	1.39028	1.39016	1.39003	1.38991
316	1.38978	1.38966	1.38953	1.38940	1.38928	1.38915	1.38903	1.38890	1.38878	1.38865
317	1.38853	1.38840	1.38828	1.38815	1.38803	1.38790	1.38778	1.38765	1.38753	1.38740
318	1.38728	1.38715	1.38703	1.38690	1.38678	1.38666	1.38653	1.38641	1.38628	1.38616
319	1.38603	1.38591	1.38579	1.38566	1.38554	1.38541	1.38529	1.38517	1.38504	1.38492
320	1.38480	1.38467	1.38455	1.38443	1.38430	1.38418	1.38405	1.38393	1.38381	1.38368
321	1.38356	1.38344	1.38332	1.38319	1.38307	1.38295	1.38282	1.38270	1.38258	1.38246
322	1.38233	1.38221	1.38209	1.38197	1.38184	1.38172	1.38160	1.38148	1.38135	1.38123
323	1.38111	1.38099	1.38086	1.38074	1.38062	1.38050	1.38038	1.38025	1.38013	1.38001
324	1.37988	1.37977	1.37965	1.37952	1.37940	1.37928	1.37916	1.37904	1.37892	1.37880
325	1.37867	1.37855	1.37843	1.37831	1.37819	1.37807	1.37795	1.37783	1.37771	1.37759
326	1.37747	1.37734	1.37722	1.37710	1.37698	1.37686	1.37674	1.37662	1.37650	1.37638
327	1.37626	1.37614	1.37602	1.37590	1.37578	1.37566	1.37554	1.37542	1.37530	1.37518
328	1.37506	1.37494	1.37482	1.37470	1.37458	1.37446	1.37434	1.37422	1.37410	1.37398
329	1.37386	1.37375	1.37363	1.37351	1.37339	1.37327	1.37315	1.37303	1.37291	1.37279
330	1.37267	1.37256	1.37244	1.37232	1.37220	1.37208	1.37196	1.37184	1.37172	1.37161
331	1.37149	1.37137	1.37125	1.37113	1.37101	1.37090	1.37078	1.37066	1.37054	1.37042
332	1.37031	1.37019	1.37007	1.36995	1.36984	1.36972	1.36960	1.36948	1.36936	1.36925
333	1.36913	1.36901	1.36889	1.36878	1.36866	1.36854	1.36843	1.36831	1.36819	1.36807
334	1.36796	1.36784	1.36772	1.36761	1.36749	1.36737	1.36726	1.36714	1.36702	1.36691
335	1.36679	1.36667	1.36656	1.36644	1.36632	1.36621	1.36609	1.36597	1.36586	1.36574
336	1.36563	1.36551	1.36539	1.36528	1.36516	1.36505	1.36493	1.36481	1.36470	1.36458
337	1.36447	1.36435	1.36424	1.36412	1.36400	1.36389	1.36377	1.36366	1.36354	1.36343
338	1.36331	1.36320	1.36308	1.36297	1.36285	1.36274	1.36262	1.36251	1.36239	1.36228
339	1.36216	1.36205	1.36193	1.36182	1.36170	1.36159	1.36147	1.36136	1.36124	1.36113
340	1.36102	1.36090	1.36079	1.36067	1.36056	1.36044	1.36033	1.36022	1.36010	1.35999
341	1.35987	1.35976	1.35965	1.35953	1.35942	1.35931	1.35919	1.35908	1.35896	1.35885
342	1.35874	1.35862	1.35851	1.35840	1.35828	1.35817	1.35806	1.35794	1.35783	1.35772
343	1.35760	1.35749	1.35738	1.35726	1.35715	1.35704	1.35693	1.35681	1.35670	1.35659
344	1.35648	1.35636	1.35625	1.35614	1.35602	1.35591	1.35580	1.35569	1.35558	1.35546
345	1.35535	1.35524	1.35513	1.35501	1.35490	1.35479	1.35468	1.35457	1.35445	1.35434
346	1.35423	1.35412	1.35401	1.35390	1.35378	1.35367	1.35356	1.35345	1.35334	1.35323
347	1.35311	1.35300	1.35289	1.35278	1.35267	1.35256	1.35245	1.35234	1.35222	1.35211
348	1.35200	1.35189	1.35178	1.35167	1.35156	1.35145	1.35134	1.35123	1.35112	1.35100
349	1.35089	1.35078	1.35067	1.35056	1.35045	1.35034	1.35023	1.35012	1.35001	1.34990
350	1.34979	1.34968	1.34957	1.34946	1.34935	1.34924	1.34913	1.34902	1.34891	1.34880
351	1.34869	1.34858	1.34847	1.34836	1.34825	1.34814	1.34803	1.34792	1.34781	1.34770
352	1.34759	1.34749	1.34738	1.34727	1.34716	1.34705	1.34694	1.34683	1.34672	1.34661
353	1.34650	1.34639	1.34628	1.34618	1.34607	1.34596	1.34585	1.34574	1.34563	1.34552
354	1.34541	1.34531	1.34520	1.34509	1.34498	1.34487	1.34476	1.34466	1.34455	1.34444
355	1.34433	1.34422	1.34411	1.34401	1.34390	1.34379	1.34368	1.34357	1.34347	1.34336
356	1.34325	1.34314	1.34304	1.34293	1.34282	1.34271	1.34260	1.34250	1.34239	1.34228

357	1.34217	1.34207	1.34196	1.34185	1.34175	1.34164	1.34153	1.34142	1.34132	1.34121
358	1.34110	1.34100	1.34089	1.34078	1.34067	1.34057	1.34046	1.34035	1.34025	1.34014
359	1.34003	1.33993	1.33982	1.33971	1.33961	1.33950	1.33939	1.33929	1.33918	1.33908
360	1.33897	1.33886	1.33876	1.33865	1.33854	1.33844	1.33833	1.33823	1.33812	1.33801
361	1.33791	1.33780	1.33770	1.33759	1.33749	1.33738	1.33727	1.33717	1.33706	1.33696
362	1.33685	1.33675	1.33664	1.33654	1.33643	1.33632	1.33622	1.33611	1.33601	1.33590
363	1.33580	1.33569	1.33559	1.33548	1.33538	1.33527	1.33517	1.33506	1.33496	1.33485
364	1.33475	1.33464	1.33454	1.33443	1.33433	1.33423	1.33412	1.33402	1.33391	1.33381
365	1.33370	1.33360	1.33349	1.33339	1.33329	1.33318	1.33308	1.33297	1.33287	1.33277
366	1.33266	1.33256	1.33245	1.33235	1.33225	1.33214	1.33204	1.33193	1.33183	1.33173
367	1.33162	1.33152	1.33142	1.33131	1.33121	1.33110	1.33100	1.33090	1.33079	1.33069
368	1.33059	1.33048	1.33038	1.33028	1.33017	1.33007	1.32997	1.32987	1.32976	1.32966
369	1.32956	1.32945	1.32935	1.32925	1.32914	1.32904	1.32894	1.32884	1.32873	1.32863
370	1.32853	1.32843	1.32832	1.32822	1.32812	1.32802	1.32791	1.32781	1.32771	1.32761
371	1.32750	1.32740	1.32730	1.32720	1.32710	1.32699	1.32689	1.32679	1.32669	1.32659
372	1.32648	1.32638	1.32628	1.32618	1.32608	1.32598	1.32587	1.32577	1.32567	1.32557
373	1.32547	1.32537	1.32526	1.32516	1.32506	1.32496	1.32486	1.32476	1.32466	1.32455
374	1.32445	1.32435	1.32425	1.32415	1.32405	1.32395	1.32385	1.32375	1.32365	1.32354
375	1.32344	1.32334	1.32324	1.32314	1.32304	1.32294	1.32284	1.32274	1.32264	1.32254
376	1.32244	1.32234	1.32224	1.32214	1.32204	1.32193	1.32183	1.32173	1.32163	1.32153
377	1.32143	1.32133	1.32123	1.32113	1.32103	1.32093	1.32083	1.32073	1.32063	1.32053
378	1.32043	1.32033	1.32023	1.32013	1.32003	1.31994	1.31984	1.31974	1.31964	1.31954
379	1.31944	1.31934	1.31924	1.31914	1.31904	1.31894	1.31884	1.31874	1.31864	1.31854
380	1.31844	1.31835	1.31825	1.31815	1.31805	1.31795	1.31785	1.31775	1.31765	1.31755
381	1.31745	1.31736	1.31726	1.31716	1.31706	1.31696	1.31686	1.31676	1.31667	1.31657
382	1.31647	1.31637	1.31627	1.31617	1.31607	1.31598	1.31588	1.31578	1.31568	1.31558
383	1.31549	1.31539	1.31529	1.31519	1.31509	1.31500	1.31490	1.31480	1.31470	1.31460
384	1.31451	1.31441	1.31431	1.31421	1.31411	1.31402	1.31392	1.31382	1.31372	1.31363
385	1.31353	1.31343	1.31333	1.31324	1.31314	1.31304	1.31295	1.31285	1.31275	1.31265
386	1.31256	1.31246	1.31236	1.31226	1.31217	1.31207	1.31197	1.31188	1.31178	1.31168
387	1.31159	1.31149	1.31139	1.31130	1.31120	1.31110	1.31101	1.31091	1.31081	1.31072
388	1.31062	1.31052	1.31043	1.31033	1.31023	1.31014	1.31004	1.30994	1.30985	1.30975
389	1.30966	1.30956	1.30946	1.30937	1.30927	1.30918	1.30908	1.30898	1.30889	1.30879
390	1.30870	1.30860	1.30850	1.30841	1.30831	1.30822	1.30812	1.30803	1.30793	1.30783
391	1.30774	1.30764	1.30755	1.30745	1.30736	1.30726	1.30717	1.30707	1.30698	1.30688
392	1.30678	1.30669	1.30659	1.30650	1.30640	1.30631	1.30621	1.30612	1.30602	1.30593
393	1.30583	1.30574	1.30564	1.30555	1.30545	1.30536	1.30526	1.30517	1.30508	1.30498
394	1.30489	1.30479	1.30470	1.30460	1.30451	1.30441	1.30432	1.30422	1.30413	1.30404
395	1.30394	1.30385	1.30375	1.30366	1.30356	1.30347	1.30338	1.30328	1.30319	1.30309
396	1.30300	1.30291	1.30281	1.30272	1.30262	1.30253	1.30244	1.30234	1.30225	1.30215
397	1.30206	1.30197	1.30187	1.30178	1.30169	1.30159	1.30150	1.30141	1.30131	1.30122
398	1.30113	1.30103	1.30094	1.30085	1.30075	1.30066	1.30057	1.30047	1.30038	1.30029
399	1.30019	1.30010	1.30001	1.29991	1.29982	1.29973	1.29963	1.29954	1.29945	1.29936
400	1.29926	1.29917	1.29908	1.29898	1.29889	1.29880	1.29871	1.29861	1.29852	1.29843
401	1.29834	1.29824	1.29815	1.29806	1.29797	1.29787	1.29778	1.29769	1.29760	1.29751
402	1.29741	1.29732	1.29723	1.29714	1.29704	1.29695	1.29686	1.29677	1.29668	1.29658
403	1.29649	1.29640	1.29631	1.29622	1.29612	1.29603	1.29594	1.29585	1.29576	1.29567
404	1.29557	1.29548	1.29539	1.29530	1.29521	1.29512	1.29503	1.29493	1.29484	1.29475
405	1.29466	1.29457	1.29448	1.29439	1.29429	1.29420	1.29411	1.29402	1.29393	1.29384
406	1.29375	1.29366	1.29357	1.29348	1.29338	1.29329	1.29320	1.29311	1.29302	1.29293
407	1.29284	1.29275	1.29266	1.29257	1.29248	1.29239	1.29230	1.29220	1.29211	1.29202
408	1.29193	1.29184	1.29175	1.29166	1.29157	1.29148	1.29139	1.29130	1.29121	1.29112
409	1.29103	1.29094	1.29085	1.29076	1.29067	1.29058	1.29049	1.29040	1.29031	1.29022
410	1.29013	1.29004	1.28995	1.28986	1.28977	1.28968	1.28959	1.28950	1.28941	1.28932
411	1.28923	1.28914	1.28905	1.28896	1.28887	1.28878	1.28869	1.28860	1.28852	1.28843
412	1.28834	1.28825	1.28816	1.28807	1.28798	1.28789	1.28780	1.28771	1.28762	1.28753
413	1.28744	1.28736	1.28727	1.28718	1.28709	1.28700	1.28691	1.28682	1.28673	1.28664
414	1.28656	1.28647	1.28638	1.28629	1.28620	1.28611	1.28602	1.28593	1.28585	1.28576
415	1.28567	1.28558	1.28549	1.28540	1.28531	1.28523	1.28514	1.28505	1.28496	1.28487
416	1.28479	1.28470	1.28461	1.28452	1.28443	1.28434	1.28426	1.28417	1.28408	1.28399

417	1.28390	1.28382	1.28373	1.28364	1.28355	1.28346	1.28338	1.28329	1.28320	1.283
418	1.28303	1.28294	1.28285	1.28276	1.28268	1.28259	1.28250	1.28241	1.28232	1.282
419	1.28215	1.28206	1.28198	1.28189	1.28180	1.28171	1.28163	1.28154	1.28145	1.281
420	1.28128	1.28119	1.28110	1.28102	1.28093	1.28084	1.28075	1.28067	1.28058	1.280
421	1.28041	1.28032	1.28023	1.28015	1.28006	1.27997	1.27989	1.27980	1.27971	1.279
422	1.27954	1.27945	1.27937	1.27928	1.27919	1.27911	1.27902	1.27893	1.27885	1.278
423	1.27867	1.27859	1.27850	1.27842	1.27833	1.27824	1.27816	1.27807	1.27798	1.277
424	1.27781	1.27773	1.27764	1.27755	1.27747	1.27738	1.27730	1.27721	1.27712	1.277
425	1.27695	1.27687	1.27678	1.27669	1.27661	1.27652	1.27644	1.27635	1.27627	1.276
426	1.27609	1.27601	1.27592	1.27584	1.27575	1.27567	1.27558	1.27550	1.27541	1.275
427	1.27524	1.27516	1.27507	1.27498	1.27490	1.27481	1.27473	1.27464	1.27456	1.274
428	1.27439	1.27430	1.27422	1.27413	1.27405	1.27396	1.27388	1.27379	1.27371	1.273
429	1.27354	1.27345	1.27337	1.27328	1.27320	1.27312	1.27303	1.27295	1.27286	1.272
430	1.27269	1.27261	1.27252	1.27244	1.27235	1.27227	1.27219	1.27210	1.27202	1.271
431	1.27185	1.27176	1.27168	1.27159	1.27151	1.27143	1.27134	1.27126	1.27117	1.271
432	1.27101	1.27092	1.27084	1.27075	1.27067	1.27059	1.27050	1.27042	1.27033	1.270
433	1.27017	1.27008	1.27000	1.26992	1.26983	1.26975	1.26966	1.26958	1.26950	1.269
434	1.26933	1.26925	1.26916	1.26908	1.26900	1.26891	1.26883	1.26875	1.26866	1.268
435	1.26850	1.26841	1.26833	1.26825	1.26816	1.26808	1.26800	1.26791	1.26783	1.267
436	1.26766	1.26758	1.26750	1.26741	1.26733	1.26725	1.26717	1.26708	1.26700	1.266
437	1.26683	1.26675	1.26667	1.26659	1.26650	1.26642	1.26634	1.26625	1.26617	1.266
438	1.26601	1.26592	1.26584	1.26576	1.26568	1.26559	1.26551	1.26543	1.26535	1.265
439	1.26518	1.26510	1.26502	1.26494	1.26485	1.26477	1.26469	1.26461	1.26452	1.264
440	1.26436	1.26428	1.26420	1.26411	1.26403	1.26395	1.26387	1.26379	1.26370	1.263
441	1.26354	1.26346	1.26338	1.26329	1.26321	1.26313	1.26305	1.26297	1.26289	1.262
442	1.26272	1.26264	1.26256	1.26248	1.26240	1.26231	1.26223	1.26215	1.26207	1.261
443	1.26191	1.26183	1.26174	1.26166	1.26158	1.26150	1.26142	1.26134	1.26126	1.261
444	1.26109	1.26101	1.26093	1.26085	1.26077	1.26069	1.26061	1.26053	1.26045	1.260
445	1.26028	1.26020	1.26012	1.26004	1.25996	1.25988	1.25980	1.25972	1.25964	1.259
446	1.25948	1.25940	1.25932	1.25923	1.25915	1.25907	1.25899	1.25891	1.25883	1.258
447	1.25867	1.25859	1.25851	1.25843	1.25835	1.25827	1.25819	1.25811	1.25803	1.257
448	1.25787	1.25779	1.25771	1.25763	1.25755	1.25747	1.25739	1.25731	1.25723	1.257
449	1.25707	1.25699	1.25691	1.25683	1.25675	1.25667	1.25659	1.25651	1.25643	1.256
450	1.25627	1.25619	1.25611	1.25603	1.25595	1.25587	1.25579	1.25571	1.25563	1.255
451	1.25547	1.25539	1.25531	1.25523	1.25515	1.25507	1.25499	1.25491	1.25484	1.254
452	1.25468	1.25460	1.25452	1.25444	1.25436	1.25428	1.25420	1.25412	1.25404	1.253
453	1.25388	1.25381	1.25373	1.25365	1.25357	1.25349	1.25341	1.25333	1.25325	1.253
454	1.25310	1.25302	1.25294	1.25286	1.25278	1.25270	1.25262	1.25254	1.25246	1.252
455	1.25231	1.25223	1.25215	1.25207	1.25199	1.25191	1.25184	1.25176	1.25168	1.251
456	1.25152	1.25144	1.25137	1.25129	1.25121	1.25113	1.25105	1.25097	1.25090	1.250
457	1.25074	1.25066	1.25058	1.25050	1.25043	1.25035	1.25027	1.25019	1.25011	1.250
458	1.24996	1.24988	1.24980	1.24972	1.24965	1.24957	1.24949	1.24941	1.24934	1.249
459	1.24918	1.24910	1.24902	1.24895	1.24887	1.24879	1.24871	1.24864	1.24856	1.248
460	1.24840	1.24833	1.24825	1.24817	1.24809	1.24802	1.24794	1.24786	1.24778	1.247
461	1.24763	1.24755	1.24747	1.24740	1.24732	1.24724	1.24717	1.24709	1.24701	1.246
462	1.24686	1.24678	1.24670	1.24663	1.24655	1.24647	1.24639	1.24632	1.24624	1.246
463	1.24609	1.24601	1.24593	1.24586	1.24578	1.24570	1.24563	1.24555	1.24547	1.245
464	1.24532	1.24524	1.24517	1.24509	1.24501	1.24494	1.24486	1.24478	1.24471	1.244
465	1.24455	1.24448	1.24440	1.24432	1.24425	1.24417	1.24409	1.24402	1.24394	1.243
466	1.24379	1.24371	1.24364	1.24356	1.24348	1.24341	1.24333	1.24326	1.24318	1.243
467	1.24303	1.24295	1.24288	1.24280	1.24272	1.24265	1.24257	1.24250	1.24242	1.242
468	1.24227	1.24219	1.24212	1.24204	1.24197	1.24189	1.24181	1.24174	1.24166	1.241
469	1.24151	1.24144	1.24136	1.24128	1.24121	1.24113	1.24106	1.24098	1.24091	1.240
470	1.24076	1.24068	1.24061	1.24053	1.24045	1.24038	1.24030	1.24023	1.24015	1.240
471	1.24000	1.23993	1.23985	1.23978	1.23970	1.23963	1.23955	1.23948	1.23940	1.239
472	1.23925	1.23918	1.23910	1.23903	1.23895	1.23888	1.23880	1.23873	1.23865	1.238
473	1.23850	1.23843	1.23835	1.23828	1.23820	1.23813	1.23805	1.23798	1.23790	1.237
474	1.23776	1.23768	1.23761	1.23753	1.23746	1.23738	1.23731	1.23723	1.23716	1.237
475	1.23701	1.23694	1.23686	1.23679	1.23671	1.23664	1.23656	1.23649	1.23642	1.236
476	1.23627	1.23619	1.23612	1.23604	1.23597	1.23590	1.23582	1.23575	1.23567	1.235

477	1.23553	1.23545	1.23538	1.23530	1.23523	1.23516	1.23508	1.23501	1.23493	1.23486
478	1.23479	1.23471	1.23464	1.23457	1.23449	1.23442	1.23434	1.23427	1.23420	1.23412
479	1.23405	1.23398	1.23390	1.23383	1.23376	1.23368	1.23361	1.23354	1.23346	1.23339
480	1.23331	1.23324	1.23317	1.23309	1.23302	1.23295	1.23287	1.23280	1.23273	1.23265
481	1.23258	1.23251	1.23244	1.23236	1.23229	1.23222	1.23214	1.23207	1.23200	1.23192
482	1.23185	1.23178	1.23170	1.23163	1.23156	1.23149	1.23141	1.23134	1.23127	1.23119
483	1.23112	1.23105	1.23098	1.23090	1.23083	1.23076	1.23068	1.23061	1.23054	1.23047
484	1.23039	1.23032	1.23025	1.23018	1.23010	1.23003	1.22996	1.22989	1.22981	1.22974
485	1.22967	1.22960	1.22952	1.22945	1.22938	1.22931	1.22923	1.22916	1.22909	1.22902
486	1.22895	1.22887	1.22880	1.22873	1.22866	1.22858	1.22851	1.22844	1.22837	1.22830
487	1.22822	1.22815	1.22808	1.22801	1.22794	1.22786	1.22779	1.22772	1.22765	1.22758
488	1.22750	1.22743	1.22736	1.22729	1.22722	1.22714	1.22707	1.22700	1.22693	1.22686
489	1.22679	1.22671	1.22664	1.22657	1.22650	1.22643	1.22636	1.22628	1.22621	1.22614
490	1.22607	1.22600	1.22593	1.22586	1.22578	1.22571	1.22564	1.22557	1.22550	1.22543
491	1.22536	1.22529	1.22521	1.22514	1.22507	1.22500	1.22493	1.22486	1.22479	1.22472
492	1.22464	1.22457	1.22450	1.22443	1.22436	1.22429	1.22422	1.22415	1.22408	1.22401
493	1.22393	1.22386	1.22379	1.22372	1.22365	1.22358	1.22351	1.22344	1.22337	1.22330
494	1.22323	1.22315	1.22308	1.22301	1.22294	1.22287	1.22280	1.22273	1.22266	1.22259
495	1.22252	1.22245	1.22238	1.22231	1.22224	1.22217	1.22210	1.22203	1.22196	1.22188
496	1.22181	1.22174	1.22167	1.22160	1.22153	1.22146	1.22139	1.22132	1.22125	1.22118
497	1.22111	1.22104	1.22097	1.22090	1.22083	1.22076	1.22069	1.22062	1.22055	1.22048
498	1.22041	1.22034	1.22027	1.22020	1.22013	1.22006	1.21999	1.21992	1.21985	1.21978
499	1.21971	1.21964	1.21957	1.21950	1.21943	1.21936	1.21929	1.21922	1.21915	1.21908
500	1.21901	1.21894	1.21887	1.21880	1.21874	1.21867	1.21860	1.21853	1.21846	1.21839
501	1.21832	1.21825	1.21818	1.21811	1.21804	1.21797	1.21790	1.21783	1.21776	1.21769
502	1.21762	1.21755	1.21749	1.21742	1.21735	1.21728	1.21721	1.21714	1.21707	1.21700
503	1.21693	1.21686	1.21679	1.21672	1.21666	1.21659	1.21652	1.21645	1.21638	1.21631
504	1.21624	1.21617	1.21610	1.21603	1.21597	1.21590	1.21583	1.21576	1.21569	1.21562
505	1.21555	1.21548	1.21542	1.21535	1.21528	1.21521	1.21514	1.21507	1.21500	1.21493
506	1.21487	1.21480	1.21473	1.21466	1.21459	1.21452	1.21445	1.21439	1.21432	1.21425
507	1.21418	1.21411	1.21404	1.21398	1.21391	1.21384	1.21377	1.21370	1.21363	1.21357
508	1.21350	1.21343	1.21336	1.21329	1.21322	1.21316	1.21309	1.21302	1.21295	1.21288
509	1.21282	1.21275	1.21268	1.21261	1.21254	1.21248	1.21241	1.21234	1.21227	1.21220
510	1.21214	1.21207	1.21200	1.21193	1.21186	1.21180	1.21173	1.21166	1.21159	1.21153
511	1.21146	1.21139	1.21132	1.21125	1.21119	1.21112	1.21105	1.21098	1.21092	1.21085
512	1.21078	1.21071	1.21065	1.21058	1.21051	1.21044	1.21038	1.21031	1.21024	1.21017
513	1.21011	1.21004	1.20997	1.20990	1.20984	1.20977	1.20970	1.20964	1.20957	1.20950
514	1.20943	1.20937	1.20930	1.20923	1.20916	1.20910	1.20903	1.20896	1.20890	1.20883
515	1.20876	1.20869	1.20863	1.20856	1.20849	1.20843	1.20836	1.20829	1.20823	1.20816
516	1.20809	1.20803	1.20796	1.20789	1.20782	1.20776	1.20769	1.20762	1.20756	1.20749
517	1.20742	1.20736	1.20729	1.20722	1.20716	1.20709	1.20702	1.20696	1.20689	1.20682
518	1.20676	1.20669	1.20662	1.20656	1.20649	1.20643	1.20636	1.20629	1.20623	1.20616
519	1.20609	1.20603	1.20596	1.20589	1.20583	1.20576	1.20569	1.20563	1.20556	1.20550
520	1.20543	1.20536	1.20530	1.20523	1.20516	1.20510	1.20503	1.20497	1.20490	1.20483
521	1.20477	1.20470	1.20464	1.20457	1.20450	1.20444	1.20437	1.20431	1.20424	1.20417
522	1.20411	1.20404	1.20398	1.20391	1.20384	1.20378	1.20371	1.20365	1.20358	1.20352
523	1.20345	1.20338	1.20332	1.20325	1.20319	1.20312	1.20306	1.20299	1.20292	1.20286
524	1.20279	1.20273	1.20266	1.20260	1.20253	1.20247	1.20240	1.20233	1.20227	1.20220
525	1.20214	1.20207	1.20201	1.20194	1.20188	1.20181	1.20175	1.20168	1.20162	1.20155
526	1.20149	1.20142	1.20135	1.20129	1.20122	1.20116	1.20109	1.20103	1.20096	1.20090
527	1.20083	1.20077	1.20070	1.20064	1.20057	1.20051	1.20044	1.20038	1.20031	1.20025
528	1.20018	1.20012	1.20005	1.19999	1.19992	1.19986	1.19979	1.19973	1.19966	1.19960
529	1.19953	1.19947	1.19940	1.19934	1.19928	1.19921	1.19915	1.19908	1.19902	1.19895
530	1.19889	1.19882	1.19876	1.19869	1.19863	1.19856	1.19850	1.19844	1.19837	1.19831
531	1.19824	1.19818	1.19811	1.19805	1.19798	1.19792	1.19786	1.19779	1.19773	1.19766
532	1.19760	1.19753	1.19747	1.19740	1.19734	1.19728	1.19721	1.19715	1.19708	1.19702
533	1.19695	1.19689	1.19683	1.19676	1.19670	1.19663	1.19657	1.19651	1.19644	1.19638
534	1.19631	1.19625	1.19619	1.19612	1.19606	1.19599	1.19593	1.19587	1.19580	1.19574
535	1.19568	1.19561	1.19555	1.19548	1.19542	1.19536	1.19529	1.19523	1.19516	1.19510
536	1.19504	1.19497	1.19491	1.19485	1.19478	1.19472	1.19466	1.19459	1.19453	1.19446

537	1.19440	1.19434	1.19427	1.19421	1.19415	1.19408	1.19402	1.19396	1.19389	1.19
538	1.19377	1.19370	1.19364	1.19358	1.19351	1.19345	1.19339	1.19332	1.19326	1.19
539	1.19313	1.19307	1.19301	1.19294	1.19288	1.19282	1.19275	1.19269	1.19263	1.19
540	1.19250	1.19244	1.19238	1.19231	1.19225	1.19219	1.19212	1.19206	1.19200	1.19
541	1.19187	1.19181	1.19175	1.19168	1.19162	1.19156	1.19149	1.19143	1.19137	1.19
542	1.19124	1.19118	1.19112	1.19105	1.19099	1.19093	1.19087	1.19080	1.19074	1.19
543	1.19062	1.19055	1.19049	1.19043	1.19036	1.19030	1.19024	1.19018	1.19011	1.19
544	1.18999	1.18993	1.18986	1.18980	1.18974	1.18966	1.18961	1.18955	1.18949	1.18
545	1.18937	1.18930	1.18924	1.18918	1.18912	1.18905	1.18899	1.18893	1.18887	1.18
546	1.18874	1.18868	1.18862	1.18856	1.18849	1.18843	1.18837	1.18831	1.18825	1.18
547	1.18812	1.18806	1.18800	1.18794	1.18787	1.18781	1.18775	1.18769	1.18763	1.18
548	1.18750	1.18744	1.18738	1.18732	1.18725	1.18719	1.18713	1.18707	1.18701	1.18
549	1.18688	1.18682	1.18676	1.18670	1.18664	1.18657	1.18651	1.18645	1.18639	1.18
550	1.18627	1.18620	1.18614	1.18608	1.18602	1.18596	1.18590	1.18583	1.18577	1.18
551	1.18565	1.18559	1.18553	1.18547	1.18540	1.18534	1.18528	1.18522	1.18516	1.18
552	1.18504	1.18498	1.18491	1.18485	1.18479	1.18473	1.18467	1.18461	1.18455	1.18
553	1.18443	1.18436	1.18430	1.18424	1.18418	1.18412	1.18406	1.18400	1.18393	1.18
554	1.18381	1.18375	1.18369	1.18363	1.18357	1.18351	1.18345	1.18339	1.18332	1.18
555	1.18320	1.18314	1.18308	1.18302	1.18296	1.18290	1.18284	1.18278	1.18272	1.18
556	1.18259	1.18253	1.18247	1.18241	1.18235	1.18229	1.18223	1.18217	1.18211	1.18
557	1.18199	1.18193	1.18187	1.18181	1.18174	1.18168	1.18162	1.18156	1.18150	1.18
558	1.18138	1.18132	1.18126	1.18120	1.18114	1.18108	1.18102	1.18096	1.18090	1.18
559	1.18078	1.18072	1.18066	1.18060	1.18054	1.18048	1.18042	1.18036	1.18030	1.18
560	1.18017	1.18011	1.18005	1.17999	1.17993	1.17987	1.17981	1.17975	1.17969	1.17
561	1.17957	1.17951	1.17945	1.17939	1.17933	1.17927	1.17921	1.17915	1.17909	1.17
562	1.17897	1.17891	1.17885	1.17879	1.17873	1.17867	1.17861	1.17855	1.17849	1.17
563	1.17837	1.17831	1.17825	1.17820	1.17814	1.17808	1.17802	1.17796	1.17790	1.17
564	1.17778	1.17772	1.17766	1.17760	1.17754	1.17748	1.17742	1.17736	1.17730	1.17
565	1.17718	1.17712	1.17706	1.17700	1.17694	1.17688	1.17682	1.17676	1.17671	1.17
566	1.17659	1.17653	1.17647	1.17641	1.17635	1.17629	1.17623	1.17617	1.17611	1.17
567	1.17599	1.17593	1.17587	1.17582	1.17576	1.17570	1.17564	1.17558	1.17552	1.17
568	1.17540	1.17534	1.17528	1.17522	1.17516	1.17511	1.17505	1.17499	1.17493	1.17
569	1.17481	1.17475	1.17469	1.17463	1.17457	1.17452	1.17446	1.17440	1.17434	1.17
570	1.17423	1.17416	1.17410	1.17405	1.17399	1.17393	1.17387	1.17381	1.17375	1.17
571	1.17363	1.17357	1.17352	1.17346	1.17340	1.17334	1.17328	1.17322	1.17316	1.17
572	1.17305	1.17299	1.17293	1.17287	1.17281	1.17275	1.17270	1.17264	1.17258	1.17
573	1.17246	1.17240	1.17234	1.17229	1.17223	1.17217	1.17211	1.17205	1.17199	1.17
574	1.17188	1.17182	1.17176	1.17170	1.17164	1.17159	1.17153	1.17147	1.17141	1.17
575	1.17130	1.17124	1.17118	1.17112	1.17106	1.17100	1.17095	1.17089	1.17083	1.17
576	1.17071	1.17066	1.17060	1.17054	1.17048	1.17042	1.17037	1.17031	1.17025	1.17
577	1.17013	1.17008	1.17002	1.16996	1.16990	1.16984	1.16979	1.16973	1.16967	1.16
578	1.16955	1.16950	1.16944	1.16938	1.16932	1.16927	1.16921	1.16915	1.16909	1.16
579	1.16898	1.16892	1.16886	1.16880	1.16875	1.16869	1.16863	1.16857	1.16852	1.16
580	1.16840	1.16834	1.16829	1.16823	1.16817	1.16811	1.16806	1.16800	1.16794	1.16
581	1.16783	1.16777	1.16771	1.16765	1.16760	1.16754	1.16748	1.16742	1.16737	1.16
582	1.16725	1.16720	1.16714	1.16708	1.16702	1.16697	1.16691	1.16685	1.16679	1.16
583	1.16668	1.16662	1.16657	1.16651	1.16645	1.16639	1.16634	1.16628	1.16622	1.16
584	1.16611	1.16605	1.16600	1.16594	1.16588	1.16582	1.16577	1.16571	1.16565	1.16
585	1.16554	1.16548	1.16543	1.16537	1.16531	1.16525	1.16520	1.16514	1.16508	1.16
586	1.16497	1.16491	1.16486	1.16480	1.16474	1.16469	1.16463	1.16457	1.16452	1.16
587	1.16440	1.16435	1.16429	1.16423	1.16418	1.16412	1.16406	1.16401	1.16395	1.16
588	1.16384	1.16378	1.16372	1.16367	1.16361	1.16355	1.16350	1.16344	1.16339	1.16
589	1.16327	1.16322	1.16316	1.16310	1.16305	1.16299	1.16293	1.16288	1.16282	1.16
590	1.16271	1.16265	1.16260	1.16254	1.16248	1.16243	1.16237	1.16231	1.16226	1.16
591	1.16215	1.16209	1.16203	1.16198	1.16192	1.16187	1.16181	1.16175	1.16170	1.16
592	1.16158	1.16153	1.16147	1.16142	1.16136	1.16130	1.16125	1.16119	1.16114	1.16
593	1.16102	1.16097	1.16091	1.16086	1.16080	1.16075	1.16069	1.16063	1.16058	1.16
594	1.16047	1.16041	1.16035	1.16030	1.16024	1.16019	1.16013	1.16008	1.16002	1.15
595	1.15991	1.15985	1.15980	1.15974	1.15969	1.15963	1.15957	1.15952	1.15946	1.15
596	1.15936	1.15930	1.15924	1.15919	1.15913	1.15907	1.15902	1.15896	1.15891	1.15

597	1.15880	1.15874	1.15869	1.15863	1.15858	1.15852	1.15846	1.15841	1.15835	1.15830
598	1.15824	1.15819	1.15813	1.15808	1.15802	1.15797	1.15791	1.15786	1.15780	1.15775
599	1.15769	1.15763	1.15758	1.15752	1.15747	1.15741	1.15736	1.15730	1.15725	1.15719
600	1.15714	1.15708	1.15703	1.15697	1.15692	1.15686	1.15681	1.15675	1.15670	1.15664
601	1.15659	1.15653	1.15648	1.15642	1.15637	1.15631	1.15626	1.15620	1.15615	1.15609
602	1.15604	1.15598	1.15593	1.15587	1.15582	1.15576	1.15571	1.15566	1.15560	1.15555
603	1.15549	1.15544	1.15538	1.15533	1.15527	1.15522	1.15516	1.15511	1.15505	1.15500
604	1.15494	1.15489	1.15483	1.15478	1.15473	1.15467	1.15462	1.15456	1.15451	1.15445
605	1.15440	1.15434	1.15429	1.15423	1.15418	1.15413	1.15407	1.15402	1.15396	1.15391
606	1.15385	1.15380	1.15374	1.15369	1.15364	1.15358	1.15353	1.15347	1.15342	1.15336
607	1.15331	1.15326	1.15320	1.15315	1.15309	1.15304	1.15298	1.15293	1.15288	1.15282
608	1.15277	1.15271	1.15266	1.15261	1.15255	1.15250	1.15244	1.15239	1.15233	1.15228
609	1.15223	1.15217	1.15212	1.15206	1.15201	1.15196	1.15190	1.15185	1.15179	1.15174
610	1.15169	1.15163	1.15158	1.15152	1.15147	1.15142	1.15136	1.15131	1.15126	1.15120
611	1.15115	1.15109	1.15104	1.15099	1.15093	1.15088	1.15083	1.15077	1.15072	1.15066
612	1.15061	1.15056	1.15050	1.15045	1.15040	1.15034	1.15029	1.15023	1.15018	1.15013
613	1.15007	1.15002	1.14997	1.14991	1.14986	1.14981	1.14975	1.14970	1.14964	1.14959
614	1.14954	1.14948	1.14943	1.14938	1.14932	1.14927	1.14922	1.14916	1.14911	1.14906
615	1.14900	1.14895	1.14890	1.14884	1.14879	1.14874	1.14868	1.14863	1.14858	1.14852
616	1.14847	1.14842	1.14836	1.14831	1.14826	1.14820	1.14815	1.14810	1.14804	1.14799
617	1.14794	1.14789	1.14783	1.14778	1.14773	1.14767	1.14762	1.14757	1.14751	1.14746
618	1.14741	1.14735	1.14730	1.14725	1.14720	1.14714	1.14709	1.14704	1.14698	1.14693
619	1.14688	1.14682	1.14677	1.14672	1.14667	1.14661	1.14656	1.14651	1.14645	1.14640
620	1.14635	1.14630	1.14624	1.14619	1.14614	1.14608	1.14603	1.14598	1.14593	1.14587
621	1.14582	1.14577	1.14572	1.14566	1.14561	1.14556	1.14550	1.14545	1.14540	1.14535
622	1.14529	1.14524	1.14519	1.14514	1.14508	1.14503	1.14498	1.14493	1.14487	1.14482
623	1.14477	1.14472	1.14466	1.14461	1.14456	1.14451	1.14445	1.14440	1.14435	1.14430
624	1.14424	1.14419	1.14414	1.14409	1.14403	1.14398	1.14393	1.14388	1.14383	1.14377
625	1.14372	1.14367	1.14362	1.14356	1.14351	1.14346	1.14341	1.14336	1.14330	1.14325
626	1.14320	1.14315	1.14309	1.14304	1.14299	1.14294	1.14289	1.14283	1.14278	1.14273
627	1.14268	1.14263	1.14257	1.14252	1.14247	1.14242	1.14236	1.14231	1.14226	1.14221
628	1.14216	1.14211	1.14205	1.14200	1.14195	1.14190	1.14185	1.14179	1.14174	1.14169
629	1.14164	1.14159	1.14153	1.14148	1.14143	1.14138	1.14133	1.14128	1.14122	1.14117
630	1.14112	1.14107	1.14102	1.14096	1.14091	1.14086	1.14081	1.14076	1.14071	1.14065
631	1.14060	1.14055	1.14050	1.14045	1.14040	1.14034	1.14029	1.14024	1.14019	1.14014
632	1.14009	1.14004	1.13998	1.13993	1.13988	1.13983	1.13978	1.13973	1.13967	1.13962
633	1.13957	1.13952	1.13947	1.13942	1.13937	1.13932	1.13926	1.13921	1.13916	1.13911
634	1.13906	1.13901	1.13896	1.13890	1.13885	1.13880	1.13875	1.13870	1.13865	1.13860
635	1.13855	1.13849	1.13844	1.13839	1.13834	1.13829	1.13824	1.13819	1.13814	1.13808
636	1.13803	1.13798	1.13793	1.13788	1.13783	1.13778	1.13773	1.13768	1.13762	1.13757
637	1.13752	1.13747	1.13742	1.13737	1.13732	1.13727	1.13722	1.13717	1.13712	1.13706
638	1.13701	1.13696	1.13691	1.13686	1.13681	1.13676	1.13671	1.13666	1.13661	1.13656
639	1.13650	1.13645	1.13640	1.13635	1.13630	1.13625	1.13620	1.13615	1.13610	1.13605
640	1.13600	1.13595	1.13590	1.13584	1.13579	1.13574	1.13569	1.13564	1.13559	1.13554
641	1.13549	1.13544	1.13539	1.13534	1.13529	1.13524	1.13519	1.13514	1.13509	1.13504
642	1.13498	1.13493	1.13488	1.13483	1.13478	1.13473	1.13468	1.13463	1.13458	1.13453
643	1.13448	1.13443	1.13438	1.13433	1.13428	1.13423	1.13418	1.13413	1.13408	1.13403
644	1.13398	1.13393	1.13388	1.13383	1.13378	1.13373	1.13367	1.13362	1.13357	1.13352
645	1.13347	1.13342	1.13337	1.13332	1.13327	1.13322	1.13317	1.13312	1.13307	1.13302
646	1.13297	1.13292	1.13287	1.13282	1.13277	1.13272	1.13267	1.13262	1.13257	1.13252
647	1.13247	1.13242	1.13237	1.13232	1.13227	1.13222	1.13217	1.13212	1.13207	1.13202
648	1.13197	1.13192	1.13187	1.13182	1.13177	1.13172	1.13167	1.13162	1.13157	1.13152
649	1.13147	1.13142	1.13137	1.13132	1.13127	1.13122	1.13117	1.13113	1.13108	1.13103
650	1.13098	1.13093	1.13088	1.13083	1.13078	1.13073	1.13068	1.13063	1.13058	1.13053
651	1.13048	1.13043	1.13038	1.13033	1.13028	1.13023	1.13018	1.13013	1.13008	1.13003
652	1.12998	1.12993	1.12988	1.12984	1.12979	1.12974	1.12969	1.12964	1.12959	1.12954
653	1.12949	1.12944	1.12939	1.12934	1.12929	1.12924	1.12919	1.12914	1.12909	1.12904
654	1.12900	1.12895	1.12890	1.12885	1.12880	1.12875	1.12870	1.12865	1.12860	1.12855
655	1.12850	1.12845	1.12840	1.12835	1.12831	1.12826	1.12821	1.12816	1.12811	1.12806
656	1.12801	1.12796	1.12791	1.12786	1.12781	1.12777	1.12772	1.12767	1.12762	1.12757

657	1.12752	1.12747	1.12742	1.12737	1.12732	1.12727	1.12723	1.12718	1.12713	1.12
658	1.12702	1.12698	1.12693	1.12688	1.12683	1.12679	1.12674	1.12669	1.12664	1.12
659	1.12654	1.12649	1.12644	1.12639	1.12635	1.12630	1.12625	1.12620	1.12615	1.12
660	1.12605	1.12600	1.12596	1.12591	1.12586	1.12581	1.12576	1.12571	1.12566	1.12
661	1.12557	1.12552	1.12547	1.12542	1.12537	1.12532	1.12527	1.12523	1.12518	1.12
662	1.12508	1.12503	1.12498	1.12493	1.12489	1.12484	1.12479	1.12474	1.12469	1.12
663	1.12459	1.12455	1.12450	1.12445	1.12440	1.12435	1.12430	1.12426	1.12421	1.12
664	1.12411	1.12406	1.12401	1.12397	1.12392	1.12387	1.12382	1.12377	1.12372	1.12
665	1.12363	1.12358	1.12353	1.12348	1.12343	1.12339	1.12334	1.12329	1.12324	1.12
666	1.12315	1.12310	1.12305	1.12300	1.12295	1.12290	1.12286	1.12281	1.12276	1.12
667	1.12267	1.12262	1.12257	1.12252	1.12247	1.12242	1.12238	1.12233	1.12228	1.12
668	1.12219	1.12214	1.12209	1.12204	1.12199	1.12194	1.12190	1.12185	1.12180	1.12
669	1.12170	1.12166	1.12161	1.12156	1.12151	1.12146	1.12142	1.12137	1.12132	1.12
670	1.12123	1.12119	1.12113	1.12108	1.12103	1.12099	1.12094	1.12089	1.12084	1.12
671	1.12075	1.12070	1.12065	1.12060	1.12056	1.12051	1.12046	1.12041	1.12037	1.12
672	1.12027	1.12022	1.12018	1.12013	1.12008	1.12003	1.11999	1.11994	1.11989	1.11
673	1.11980	1.11975	1.11970	1.11965	1.11960	1.11956	1.11951	1.11946	1.11942	1.11
674	1.11932	1.11927	1.11923	1.11918	1.11913	1.11908	1.11904	1.11899	1.11894	1.11
675	1.11885	1.11880	1.11875	1.11870	1.11866	1.11861	1.11856	1.11851	1.11847	1.11
676	1.11837	1.11833	1.11828	1.11823	1.11818	1.11814	1.11809	1.11804	1.11800	1.11
677	1.11790	1.11785	1.11781	1.11776	1.11771	1.11766	1.11762	1.11757	1.11752	1.11
678	1.11743	1.11738	1.11734	1.11729	1.11724	1.11719	1.11715	1.11710	1.11705	1.11
679	1.11696	1.11691	1.11686	1.11682	1.11677	1.11672	1.11668	1.11663	1.11658	1.11
680	1.11649	1.11644	1.11640	1.11635	1.11630	1.11625	1.11621	1.11616	1.11611	1.11
681	1.11602	1.11597	1.11593	1.11588	1.11583	1.11579	1.11574	1.11569	1.11565	1.11
682	1.11555	1.11551	1.11546	1.11541	1.11537	1.11532	1.11527	1.11523	1.11518	1.11
683	1.11509	1.11504	1.11499	1.11495	1.11490	1.11485	1.11481	1.11476	1.11471	1.11
684	1.11462	1.11457	1.11453	1.11448	1.11443	1.11439	1.11434	1.11429	1.11425	1.11
685	1.11415	1.11411	1.11406	1.11402	1.11397	1.11392	1.11388	1.11383	1.11378	1.11
686	1.11369	1.11364	1.11360	1.11355	1.11351	1.11346	1.11341	1.11337	1.11332	1.11
687	1.11323	1.11318	1.11313	1.11309	1.11304	1.11300	1.11295	1.11290	1.11286	1.11
688	1.11277	1.11272	1.11267	1.11263	1.11258	1.11253	1.11249	1.11244	1.11240	1.11
689	1.11230	1.11226	1.11221	1.11216	1.11212	1.11207	1.11203	1.11198	1.11193	1.11
690	1.11184	1.11180	1.11175	1.11170	1.11166	1.11161	1.11157	1.11152	1.11147	1.11
691	1.11138	1.11134	1.11129	1.11124	1.11120	1.11115	1.11111	1.11106	1.11101	1.11
692	1.11092	1.11088	1.11083	1.11079	1.11074	1.11069	1.11065	1.11060	1.11056	1.11
693	1.11046	1.11042	1.11037	1.11033	1.11028	1.11024	1.11019	1.11014	1.11010	1.11
694	1.11001	1.10996	1.10992	1.10987	1.10982	1.10978	1.10973	1.10969	1.10964	1.10
695	1.10955	1.10951	1.10946	1.10941	1.10937	1.10932	1.10928	1.10923	1.10919	1.10
696	1.10910	1.10905	1.10900	1.10896	1.10891	1.10887	1.10882	1.10878	1.10873	1.10
697	1.10864	1.10859	1.10855	1.10850	1.10846	1.10841	1.10837	1.10832	1.10828	1.10
698	1.10819	1.10814	1.10810	1.10805	1.10800	1.10796	1.10791	1.10787	1.10782	1.10
699	1.10773	1.10769	1.10764	1.10760	1.10755	1.10751	1.10746	1.10742	1.10737	1.10
700	1.10728	1.10724	1.10719	1.10715	1.10710	1.10705	1.10701	1.10696	1.10692	1.10
701	1.10683	1.10678	1.10674	1.10669	1.10665	1.10660	1.10656	1.10651	1.10647	1.10
702	1.10638	1.10633	1.10629	1.10624	1.10620	1.10615	1.10611	1.10606	1.10602	1.10
703	1.10593	1.10588	1.10584	1.10579	1.10575	1.10570	1.10566	1.10561	1.10557	1.10
704	1.10548	1.10543	1.10539	1.10534	1.10530	1.10526	1.10521	1.10517	1.10512	1.10
705	1.10503	1.10499	1.10494	1.10490	1.10485	1.10481	1.10476	1.10472	1.10467	1.10
706	1.10458	1.10454	1.10449	1.10445	1.10441	1.10436	1.10432	1.10427	1.10423	1.10
707	1.10414	1.10409	1.10405	1.10400	1.10396	1.10391	1.10387	1.10383	1.10378	1.10
708	1.10369	1.10365	1.10360	1.10356	1.10351	1.10347	1.10342	1.10338	1.10334	1.10
709	1.10325	1.10320	1.10316	1.10311	1.10307	1.10302	1.10298	1.10294	1.10289	1.10
710	1.10280	1.10276	1.10271	1.10267	1.10262	1.10258	1.10254	1.10249	1.10245	1.10
711	1.10236	1.10231	1.10227	1.10223	1.10218	1.10214	1.10209	1.10205	1.10200	1.10
712	1.10192	1.10187	1.10183	1.10178	1.10174	1.10170	1.10165	1.10161	1.10156	1.10
713	1.10147	1.10143	1.10139	1.10134	1.10130	1.10125	1.10121	1.10117	1.10112	1.10
714	1.10103	1.10099	1.10095	1.10090	1.10086	1.10081	1.10077	1.10073	1.10069	1.10
715	1.10059	1.10055	1.10051	1.10046	1.10042	1.10037	1.10033	1.10029	1.10024	1.10
716	1.10015	1.10011	1.10007	1.10002	1.09998	1.09993	1.09989	1.09985	1.09980	1.09

717	1.09972	1.09967	1.09963	1.09958	1.09954	1.09950	1.09945	1.09941	1.09936	1.09932
718	1.09928	1.09923	1.09919	1.09915	1.09910	1.09906	1.09902	1.09897	1.09893	1.09888
719	1.09884	1.09880	1.09875	1.09871	1.09867	1.09862	1.09858	1.09853	1.09849	1.09845
720	1.09840	1.09836	1.09832	1.09827	1.09823	1.09819	1.09814	1.09810	1.09806	1.09801
721	1.09797	1.09793	1.09788	1.09784	1.09779	1.09775	1.09771	1.09766	1.09762	1.09758
722	1.09753	1.09749	1.09745	1.09740	1.09736	1.09732	1.09727	1.09723	1.09719	1.09714
723	1.09710	1.09706	1.09701	1.09697	1.09693	1.09688	1.09684	1.09680	1.09675	1.09671
724	1.09667	1.09662	1.09658	1.09654	1.09649	1.09645	1.09641	1.09636	1.09632	1.09628
725	1.09623	1.09619	1.09615	1.09610	1.09606	1.09602	1.09598	1.09593	1.09589	1.09585
726	1.09580	1.09576	1.09572	1.09567	1.09563	1.09559	1.09554	1.09550	1.09546	1.09541
727	1.09537	1.09533	1.09529	1.09524	1.09520	1.09516	1.09511	1.09507	1.09503	1.09498
728	1.09494	1.09490	1.09486	1.09481	1.09477	1.09473	1.09468	1.09464	1.09460	1.09455
729	1.09451	1.09447	1.09443	1.09438	1.09434	1.09430	1.09426	1.09421	1.09417	1.09413
730	1.09408	1.09404	1.09400	1.09396	1.09391	1.09387	1.09383	1.09378	1.09374	1.09370
731	1.09366	1.09361	1.09357	1.09353	1.09349	1.09344	1.09340	1.09336	1.09331	1.09327
732	1.09323	1.09319	1.09314	1.09310	1.09306	1.09302	1.09297	1.09293	1.09289	1.09285
733	1.09280	1.09276	1.09272	1.09267	1.09263	1.09259	1.09255	1.09250	1.09246	1.09242
734	1.09238	1.09233	1.09229	1.09225	1.09221	1.09216	1.09212	1.09208	1.09204	1.09199
735	1.09195	1.09191	1.09187	1.09182	1.09178	1.09174	1.09170	1.09166	1.09161	1.09157
736	1.09153	1.09149	1.09144	1.09140	1.09136	1.09132	1.09127	1.09123	1.09119	1.09115
737	1.09110	1.09106	1.09102	1.09098	1.09094	1.09089	1.09085	1.09081	1.09077	1.09072
738	1.09068	1.09064	1.09060	1.09056	1.09051	1.09047	1.09043	1.09039	1.09034	1.09030
739	1.09026	1.09022	1.09018	1.09013	1.09009	1.09005	1.09001	1.08997	1.08992	1.08988
740	1.08984	1.08980	1.08975	1.08971	1.08967	1.08963	1.08959	1.08954	1.08950	1.08946
741	1.08942	1.08938	1.08933	1.08929	1.08925	1.08921	1.08917	1.08912	1.08908	1.08904
742	1.08900	1.08896	1.08892	1.08887	1.08883	1.08879	1.08875	1.08871	1.08866	1.08862
743	1.08858	1.08854	1.08850	1.08845	1.08841	1.08837	1.08833	1.08829	1.08825	1.08820
744	1.08816	1.08812	1.08808	1.08804	1.08799	1.08795	1.08791	1.08787	1.08783	1.08779
745	1.08774	1.08770	1.08766	1.08762	1.08758	1.08754	1.08749	1.08745	1.08741	1.08737
746	1.08733	1.08729	1.08724	1.08720	1.08716	1.08712	1.08708	1.08704	1.08699	1.08695
747	1.08691	1.08687	1.08683	1.08679	1.08675	1.08670	1.08666	1.08662	1.08658	1.08654
748	1.08650	1.08645	1.08641	1.08637	1.08633	1.08629	1.08625	1.08621	1.08616	1.08612
749	1.08608	1.08604	1.08600	1.08596	1.08592	1.08587	1.08583	1.08579	1.08575	1.08571
750	1.08567	1.08563	1.08558	1.08554	1.08550	1.08546	1.08542	1.08538	1.08534	1.08530
751	1.08525	1.08521	1.08517	1.08513	1.08509	1.08505	1.08501	1.08497	1.08492	1.08488
752	1.08484	1.08480	1.08476	1.08472	1.08468	1.08464	1.08459	1.08455	1.08451	1.08447
753	1.08443	1.08439	1.08435	1.08431	1.08427	1.08422	1.08418	1.08414	1.08410	1.08406
754	1.08402	1.08398	1.08394	1.08390	1.08385	1.08381	1.08377	1.08373	1.08369	1.08365
755	1.08361	1.08357	1.08353	1.08349	1.08344	1.08340	1.08336	1.08332	1.08328	1.08324
756	1.08320	1.08316	1.08312	1.08308	1.08303	1.08299	1.08295	1.08291	1.08287	1.08283
757	1.08279	1.08275	1.08271	1.08267	1.08263	1.08259	1.08254	1.08250	1.08246	1.08242
758	1.08238	1.08234	1.08230	1.08226	1.08222	1.08218	1.08214	1.08210	1.08206	1.08201
759	1.08197	1.08193	1.08189	1.08185	1.08181	1.08177	1.08173	1.08169	1.08165	1.08161
760	1.08157	1.08153	1.08149	1.08144	1.08140	1.08136	1.08132	1.08128	1.08124	1.08120
761	1.08116	1.08112	1.08108	1.08104	1.08100	1.08096	1.08092	1.08088	1.08084	1.08080
762	1.08075	1.08071	1.08067	1.08063	1.08059	1.08055	1.08051	1.08047	1.08043	1.08039
763	1.08035	1.08031	1.08027	1.08023	1.08019	1.08015	1.08011	1.08007	1.08003	1.07999
764	1.07995	1.07991	1.07986	1.07982	1.07978	1.07974	1.07970	1.07966	1.07962	1.07958
765	1.07954	1.07950	1.07946	1.07942	1.07938	1.07934	1.07930	1.07926	1.07922	1.07918
766	1.07914	1.07910	1.07906	1.07902	1.07898	1.07894	1.07890	1.07886	1.07882	1.07878
767	1.07874	1.07870	1.07866	1.07862	1.07858	1.07854	1.07850	1.07846	1.07842	1.07838
768	1.07834	1.07830	1.07826	1.07822	1.07818	1.07814	1.07810	1.07805	1.07801	1.07797
769	1.07793	1.07789	1.07785	1.07781	1.07777	1.07773	1.07769	1.07765	1.07761	1.07757
770	1.07753	1.07749	1.07745	1.07741	1.07737	1.07733	1.07729	1.07725	1.07721	1.07718
771	1.07714	1.07710	1.07706	1.07702	1.07698	1.07694	1.07690	1.07686	1.07682	1.07678
772	1.07674	1.07670	1.07666	1.07662	1.07658	1.07654	1.07650	1.07646	1.07642	1.07638
773	1.07634	1.07630	1.07626	1.07622	1.07618	1.07614	1.07610	1.07606	1.07602	1.07598
774	1.07594	1.07590	1.07586	1.07582	1.07578	1.07574	1.07570	1.07566	1.07562	1.07558
775	1.07554	1.07550	1.07546	1.07542	1.07539	1.07535	1.07531	1.07527	1.07523	1.07519
776	1.07515	1.07511	1.07507	1.07503	1.07499	1.07495	1.07491	1.07487	1.07483	1.07479

777	1.07475	1.07471	1.07467	1.07463	1.07459	1.07455	1.07452	1.07448	1.07444	1.074
778	1.07436	1.07432	1.07428	1.07424	1.07420	1.07416	1.07412	1.07408	1.07404	1.074
779	1.07396	1.07392	1.07388	1.07384	1.07381	1.07377	1.07373	1.07369	1.07365	1.073
780	1.07357	1.07353	1.07349	1.07345	1.07341	1.07337	1.07333	1.07329	1.07325	1.073
781	1.07318	1.07314	1.07310	1.07306	1.07302	1.07298	1.07294	1.07290	1.07286	1.072
782	1.07278	1.07274	1.07271	1.07267	1.07263	1.07259	1.07255	1.07251	1.07247	1.072
783	1.07239	1.07235	1.07231	1.07228	1.07224	1.07220	1.07216	1.07212	1.07208	1.072
784	1.07200	1.07196	1.07192	1.07188	1.07185	1.07181	1.07177	1.07173	1.07169	1.071
785	1.07161	1.07157	1.07153	1.07149	1.07146	1.07142	1.07138	1.07134	1.07130	1.071
786	1.07122	1.07118	1.07114	1.07110	1.07107	1.07103	1.07099	1.07095	1.07091	1.070
787	1.07083	1.07079	1.07075	1.07072	1.07068	1.07064	1.07060	1.07056	1.07052	1.070
788	1.07044	1.07041	1.07037	1.07033	1.07029	1.07025	1.07021	1.07017	1.07013	1.070
789	1.07006	1.07002	1.06998	1.06994	1.06990	1.06986	1.06982	1.06979	1.06975	1.069
790	1.06967	1.06963	1.06959	1.06955	1.06951	1.06948	1.06944	1.06940	1.06936	1.069
791	1.06928	1.06924	1.06921	1.06917	1.06913	1.06909	1.06905	1.06901	1.06897	1.068
792	1.06890	1.06886	1.06882	1.06878	1.06874	1.06870	1.06867	1.06863	1.06859	1.068
793	1.06851	1.06847	1.06843	1.06840	1.06836	1.06832	1.06828	1.06824	1.06820	1.068
794	1.06813	1.06809	1.06805	1.06801	1.06797	1.06793	1.06790	1.06786	1.06782	1.067
795	1.06774	1.06770	1.06767	1.06763	1.06759	1.06755	1.06751	1.06747	1.06744	1.067
796	1.06736	1.06732	1.06728	1.06724	1.06721	1.06717	1.06713	1.06709	1.06705	1.067
797	1.06698	1.06694	1.06690	1.06686	1.06682	1.06679	1.06675	1.06671	1.06667	1.066
798	1.06659	1.06656	1.06652	1.06648	1.06644	1.06640	1.06637	1.06633	1.06629	1.066
799	1.06621	1.06617	1.06614	1.06610	1.06606	1.06602	1.06598	1.06595	1.06591	1.065
800	1.06583	1.06579	1.06576	1.06572	1.06568	1.06564	1.06560	1.06557	1.06553	1.065
801	1.06545	1.06541	1.06538	1.06534	1.06530	1.06526	1.06522	1.06519	1.06515	1.065
802	1.06507	1.06503	1.06500	1.06496	1.06492	1.06488	1.06484	1.06481	1.06477	1.064
803	1.06469	1.06465	1.06462	1.06458	1.06454	1.06450	1.06447	1.06443	1.06439	1.064
804	1.06431	1.06428	1.06424	1.06420	1.06416	1.06412	1.06409	1.06405	1.06401	1.063
805	1.06394	1.06390	1.06386	1.06382	1.06378	1.06375	1.06371	1.06367	1.06363	1.063
806	1.06356	1.06352	1.06348	1.06345	1.06341	1.06337	1.06333	1.06329	1.06326	1.063
807	1.06318	1.06314	1.06311	1.06307	1.06303	1.06299	1.06296	1.06292	1.06288	1.062
808	1.06281	1.06277	1.06273	1.06269	1.06266	1.06262	1.06258	1.06254	1.06251	1.062
809	1.06243	1.06239	1.06236	1.06232	1.06228	1.06224	1.06221	1.06217	1.06213	1.062
810	1.06206	1.06202	1.06198	1.06194	1.06191	1.06187	1.06183	1.06179	1.06176	1.061
811	1.06168	1.06164	1.06161	1.06157	1.06153	1.06149	1.06146	1.06142	1.06138	1.061
812	1.06131	1.06127	1.06123	1.06120	1.06116	1.06112	1.06108	1.06105	1.06101	1.060
813	1.06093	1.06090	1.06086	1.06082	1.06079	1.06075	1.06071	1.06067	1.06064	1.060
814	1.06056	1.06052	1.06049	1.06045	1.06041	1.06038	1.06034	1.06030	1.06026	1.060
815	1.06019	1.06015	1.06012	1.06008	1.06004	1.06000	1.05997	1.05993	1.05989	1.059
816	1.05982	1.05978	1.05974	1.05971	1.05967	1.05963	1.05960	1.05956	1.05952	1.059
817	1.05945	1.05941	1.05937	1.05934	1.05930	1.05926	1.05923	1.05919	1.05915	1.059
818	1.05908	1.05904	1.05900	1.05897	1.05893	1.05889	1.05886	1.05882	1.05878	1.058
819	1.05871	1.05867	1.05863	1.05860	1.05856	1.05852	1.05849	1.05845	1.05841	1.058
820	1.05834	1.05830	1.05826	1.05823	1.05819	1.05815	1.05812	1.05808	1.05804	1.058
821	1.05797	1.05793	1.05790	1.05786	1.05782	1.05779	1.05775	1.05771	1.05768	1.057
822	1.05760	1.05757	1.05753	1.05749	1.05746	1.05742	1.05738	1.05734	1.05731	1.057
823	1.05723	1.05720	1.05716	1.05712	1.05709	1.05705	1.05701	1.05698	1.05694	1.056
824	1.05687	1.05683	1.05679	1.05676	1.05672	1.05668	1.05665	1.05661	1.05658	1.056
825	1.05650	1.05647	1.05643	1.05639	1.05636	1.05632	1.05628	1.05625	1.05621	1.056
826	1.05614	1.05610	1.05606	1.05603	1.05599	1.05595	1.05592	1.05588	1.05584	1.055
827	1.05577	1.05573	1.05570	1.05566	1.05563	1.05559	1.05555	1.05552	1.05548	1.055
828	1.05541	1.05537	1.05533	1.05530	1.05526	1.05522	1.05519	1.05515	1.05512	1.055
829	1.05504	1.05501	1.05497	1.05493	1.05490	1.05486	1.05482	1.05479	1.05475	1.054
830	1.05468	1.05464	1.05461	1.05457	1.05453	1.05450	1.05446	1.05443	1.05439	1.054
831	1.05432	1.05428	1.05424	1.05421	1.05417	1.05414	1.05410	1.05406	1.05403	1.053
832	1.05395	1.05392	1.05388	1.05385	1.05381	1.05377	1.05374	1.05370	1.05367	1.053
833	1.05359	1.05356	1.05352	1.05348	1.05345	1.05341	1.05338	1.05334	1.05330	1.053
834	1.05323	1.05320	1.05316	1.05312	1.05309	1.05305	1.05302	1.05298	1.05294	1.052
835	1.05287	1.05284	1.05280	1.05276	1.05273	1.05269	1.05266	1.05262	1.05258	1.052
836	1.05251	1.05248	1.05244	1.05240	1.05237	1.05233	1.05230	1.05226	1.05222	1.052

837	1.05215	1.05212	1.05208	1.05204	1.05201	1.05197	1.05194	1.05190	1.05186	1.05183
838	1.05179	1.05176	1.05172	1.05169	1.05165	1.05161	1.05158	1.05154	1.05151	1.05147
839	1.05143	1.05140	1.05136	1.05133	1.05129	1.05126	1.05122	1.05118	1.05115	1.05111
840	1.05108	1.05104	1.05101	1.05097	1.05093	1.05090	1.05086	1.05083	1.05079	1.05076
841	1.05072	1.05068	1.05065	1.05061	1.05058	1.05054	1.05051	1.05047	1.05043	1.05040
842	1.05036	1.05033	1.05029	1.05026	1.05022	1.05018	1.05015	1.05011	1.05008	1.05004
843	1.05001	1.04997	1.04994	1.04990	1.04986	1.04983	1.04979	1.04976	1.04972	1.04969
844	1.04965	1.04962	1.04958	1.04954	1.04951	1.04947	1.04944	1.04940	1.04937	1.04933
845	1.04930	1.04926	1.04923	1.04919	1.04915	1.04912	1.04908	1.04905	1.04901	1.04898
846	1.04894	1.04891	1.04887	1.04884	1.04880	1.04876	1.04873	1.04869	1.04866	1.04862
847	1.04859	1.04855	1.04852	1.04848	1.04845	1.04841	1.04838	1.04834	1.04830	1.04827
848	1.04823	1.04820	1.04816	1.04813	1.04809	1.04806	1.04802	1.04799	1.04795	1.04792
849	1.04788	1.04785	1.04781	1.04778	1.04774	1.04771	1.04767	1.04763	1.04760	1.04756
850	1.04753	1.04749	1.04746	1.04742	1.04739	1.04735	1.04732	1.04728	1.04725	1.04721
851	1.04718	1.04714	1.04711	1.04707	1.04704	1.04700	1.04697	1.04693	1.04690	1.04686
852	1.04683	1.04679	1.04676	1.04672	1.04669	1.04665	1.04662	1.04658	1.04655	1.04651
853	1.04647	1.04644	1.04640	1.04637	1.04633	1.04630	1.04626	1.04623	1.04619	1.04616
854	1.04612	1.04609	1.04605	1.04602	1.04598	1.04595	1.04591	1.04588	1.04584	1.04581
855	1.04577	1.04574	1.04571	1.04567	1.04564	1.04560	1.04557	1.04553	1.04550	1.04546
856	1.04543	1.04539	1.04536	1.04532	1.04529	1.04525	1.04522	1.04518	1.04515	1.04511
857	1.04508	1.04504	1.04501	1.04497	1.04494	1.04490	1.04487	1.04483	1.04480	1.04476
858	1.04473	1.04469	1.04466	1.04462	1.04459	1.04456	1.04452	1.04449	1.04445	1.04442
859	1.04438	1.04435	1.04431	1.04428	1.04424	1.04421	1.04417	1.04414	1.04410	1.04407
860	1.04403	1.04400	1.04396	1.04393	1.04390	1.04386	1.04383	1.04379	1.04376	1.04372
861	1.04369	1.04365	1.04362	1.04358	1.04355	1.04351	1.04348	1.04345	1.04341	1.04338
862	1.04334	1.04331	1.04327	1.04324	1.04320	1.04317	1.04313	1.04310	1.04307	1.04303
863	1.04300	1.04296	1.04293	1.04289	1.04286	1.04282	1.04279	1.04275	1.04272	1.04269
864	1.04265	1.04262	1.04258	1.04255	1.04251	1.04248	1.04244	1.04241	1.04238	1.04234
865	1.04231	1.04227	1.04224	1.04220	1.04217	1.04213	1.04210	1.04207	1.04203	1.04200
866	1.04196	1.04193	1.04189	1.04186	1.04182	1.04179	1.04176	1.04172	1.04169	1.04165
867	1.04162	1.04158	1.04155	1.04152	1.04148	1.04145	1.04141	1.04138	1.04134	1.04131
868	1.04128	1.04124	1.04121	1.04117	1.04114	1.04110	1.04107	1.04104	1.04100	1.04097
869	1.04093	1.04090	1.04086	1.04083	1.04080	1.04076	1.04073	1.04069	1.04066	1.04063
870	1.04059	1.04056	1.04052	1.04049	1.04045	1.04042	1.04039	1.04035	1.04032	1.04028
871	1.04025	1.04022	1.04018	1.04015	1.04011	1.04008	1.04005	1.04001	1.03998	1.03994
872	1.03991	1.03987	1.03984	1.03981	1.03977	1.03974	1.03970	1.03967	1.03964	1.03960
873	1.03957	1.03953	1.03950	1.03947	1.03943	1.03940	1.03936	1.03933	1.03930	1.03926
874	1.03923	1.03919	1.03916	1.03913	1.03909	1.03906	1.03902	1.03899	1.03896	1.03892
875	1.03889	1.03886	1.03882	1.03879	1.03875	1.03872	1.03869	1.03865	1.03862	1.03858
876	1.03855	1.03852	1.03848	1.03845	1.03841	1.03838	1.03835	1.03831	1.03828	1.03825
877	1.03821	1.03818	1.03814	1.03811	1.03808	1.03804	1.03801	1.03797	1.03794	1.03791
878	1.03787	1.03784	1.03781	1.03777	1.03774	1.03770	1.03767	1.03764	1.03760	1.03757
879	1.03754	1.03750	1.03747	1.03743	1.03740	1.03737	1.03733	1.03730	1.03727	1.03723
880	1.03720	1.03717	1.03713	1.03710	1.03706	1.03703	1.03700	1.03696	1.03693	1.03690
881	1.03686	1.03683	1.03680	1.03676	1.03673	1.03669	1.03666	1.03663	1.03659	1.03656
882	1.03653	1.03649	1.03646	1.03643	1.03639	1.03636	1.03633	1.03629	1.03626	1.03622
883	1.03619	1.03616	1.03612	1.03609	1.03606	1.03602	1.03599	1.03596	1.03592	1.03589
884	1.03586	1.03582	1.03579	1.03576	1.03572	1.03569	1.03566	1.03562	1.03559	1.03555
885	1.03552	1.03549	1.03545	1.03542	1.03539	1.03535	1.03532	1.03529	1.03525	1.03522
886	1.03519	1.03515	1.03512	1.03509	1.03505	1.03502	1.03499	1.03495	1.03492	1.03489
887	1.03485	1.03482	1.03479	1.03475	1.03472	1.03469	1.03465	1.03462	1.03459	1.03455
888	1.03452	1.03449	1.03445	1.03442	1.03439	1.03435	1.03432	1.03429	1.03425	1.03422
889	1.03419	1.03415	1.03412	1.03409	1.03406	1.03402	1.03399	1.03396	1.03392	1.03389
890	1.03386	1.03382	1.03379	1.03376	1.03372	1.03369	1.03366	1.03362	1.03359	1.03356
891	1.03352	1.03349	1.03346	1.03342	1.03339	1.03336	1.03333	1.03329	1.03326	1.03323
892	1.03319	1.03316	1.03313	1.03309	1.03306	1.03303	1.03299	1.03296	1.03293	1.03290
893	1.03286	1.03283	1.03280	1.03276	1.03273	1.03270	1.03266	1.03263	1.03260	1.03257
894	1.03253	1.03250	1.03247	1.03243	1.03240	1.03237	1.03233	1.03230	1.03227	1.03224
895	1.03220	1.03217	1.03214	1.03210	1.03207	1.03204	1.03200	1.03197	1.03194	1.03191
896	1.03187	1.03184	1.03181	1.03177	1.03174	1.03171	1.03168	1.03164	1.03161	1.03158

897	1.03154	1.03151	1.03148	1.03145	1.03141	1.03138	1.03135	1.03131	1.03128	1.03125
898	1.03122	1.03118	1.03115	1.03112	1.03108	1.03105	1.03102	1.03099	1.03095	1.03092
899	1.03089	1.03086	1.03082	1.03079	1.03076	1.03072	1.03069	1.03066	1.03063	1.03059
900	1.03056	1.03053	1.03050	1.03046	1.03043	1.03040	1.03036	1.03033	1.03030	1.03027
901	1.03023	1.03020	1.03017	1.03014	1.03010	1.03007	1.03004	1.03001	1.02997	1.02994
902	1.02991	1.02987	1.02984	1.02981	1.02978	1.02974	1.02971	1.02968	1.02965	1.02961
903	1.02958	1.02955	1.02952	1.02948	1.02945	1.02942	1.02939	1.02935	1.02932	1.02929
904	1.02926	1.02922	1.02919	1.02916	1.02913	1.02909	1.02906	1.02903	1.02900	1.02896
905	1.02893	1.02890	1.02887	1.02883	1.02880	1.02877	1.02874	1.02870	1.02867	1.02864
906	1.02861	1.02857	1.02854	1.02851	1.02848	1.02844	1.02841	1.02838	1.02835	1.02831
907	1.02828	1.02825	1.02822	1.02818	1.02815	1.02812	1.02809	1.02806	1.02802	1.02799
908	1.02796	1.02793	1.02789	1.02786	1.02783	1.02780	1.02776	1.02773	1.02770	1.02767
909	1.02764	1.02760	1.02757	1.02754	1.02751	1.02747	1.02744	1.02741	1.02738	1.02734
910	1.02731	1.02728	1.02725	1.02722	1.02718	1.02715	1.02712	1.02709	1.02705	1.02702
911	1.02699	1.02696	1.02693	1.02689	1.02686	1.02683	1.02680	1.02676	1.02673	1.02670
912	1.02667	1.02664	1.02660	1.02657	1.02654	1.02651	1.02648	1.02644	1.02641	1.02638
913	1.02635	1.02631	1.02628	1.02625	1.02622	1.02619	1.02615	1.02612	1.02609	1.02606
914	1.02603	1.02599	1.02596	1.02593	1.02590	1.02587	1.02583	1.02580	1.02577	1.02574
915	1.02571	1.02567	1.02564	1.02561	1.02558	1.02555	1.02551	1.02548	1.02545	1.02542
916	1.02539	1.02535	1.02532	1.02529	1.02526	1.02523	1.02519	1.02516	1.02513	1.02510
917	1.02507	1.02503	1.02500	1.02497	1.02494	1.02491	1.02487	1.02484	1.02481	1.02478
918	1.02475	1.02471	1.02468	1.02465	1.02462	1.02459	1.02456	1.02452	1.02449	1.02446
919	1.02443	1.02440	1.02436	1.02433	1.02430	1.02427	1.02424	1.02420	1.02417	1.02414
920	1.02411	1.02408	1.02405	1.02401	1.02398	1.02395	1.02392	1.02389	1.02386	1.02382
921	1.02379	1.02376	1.02373	1.02370	1.02366	1.02363	1.02360	1.02357	1.02354	1.02351
922	1.02347	1.02344	1.02341	1.02338	1.02335	1.02332	1.02328	1.02325	1.02322	1.02319
923	1.02316	1.02313	1.02309	1.02306	1.02303	1.02300	1.02297	1.02294	1.02290	1.02287
924	1.02284	1.02281	1.02278	1.02275	1.02271	1.02268	1.02265	1.02262	1.02259	1.02256
925	1.02253	1.02249	1.02246	1.02243	1.02240	1.02237	1.02234	1.02230	1.02227	1.02224
926	1.02221	1.02218	1.02215	1.02211	1.02208	1.02205	1.02202	1.02199	1.02196	1.02193
927	1.02189	1.02186	1.02183	1.02180	1.02177	1.02174	1.02170	1.02167	1.02164	1.02161
928	1.02158	1.02155	1.02152	1.02148	1.02145	1.02142	1.02139	1.02136	1.02133	1.02130
929	1.02124	1.02123	1.02120	1.02117	1.02114	1.02111	1.02108	1.02105	1.02101	1.02098
930	1.02095	1.02092	1.02089	1.02086	1.02083	1.02079	1.02076	1.02073	1.02070	1.02067
931	1.02064	1.02061	1.02057	1.02054	1.02051	1.02048	1.02045	1.02042	1.02039	1.02036
932	1.02032	1.02029	1.02026	1.02023	1.02020	1.02017	1.02014	1.02011	1.02007	1.02004
933	1.02001	1.01998	1.01995	1.01992	1.01989	1.01986	1.01982	1.01979	1.01976	1.01973
934	1.01970	1.01967	1.01964	1.01961	1.01958	1.01954	1.01951	1.01948	1.01945	1.01942
935	1.01939	1.01936	1.01933	1.01929	1.01926	1.01923	1.01920	1.01917	1.01914	1.01911
936	1.01908	1.01905	1.01901	1.01898	1.01895	1.01892	1.01889	1.01886	1.01883	1.01880
937	1.01877	1.01873	1.01870	1.01867	1.01864	1.01861	1.01858	1.01855	1.01852	1.01849
938	1.01846	1.01843	1.01839	1.01836	1.01833	1.01830	1.01827	1.01824	1.01821	1.01818
939	1.01815	1.01811	1.01808	1.01805	1.01802	1.01799	1.01796	1.01793	1.01790	1.01787
940	1.01784	1.01780	1.01777	1.01774	1.01771	1.01768	1.01765	1.01762	1.01759	1.01756
941	1.01753	1.01750	1.01746	1.01743	1.01740	1.01737	1.01734	1.01731	1.01728	1.01725
942	1.01722	1.01719	1.01716	1.01713	1.01709	1.01706	1.01703	1.01700	1.01697	1.01694
943	1.01691	1.01688	1.01685	1.01682	1.01679	1.01676	1.01672	1.01669	1.01666	1.01663
944	1.01660	1.01657	1.01654	1.01651	1.01648	1.01645	1.01642	1.01639	1.01636	1.01633
945	1.01629	1.01626	1.01623	1.01620	1.01617	1.01614	1.01611	1.01608	1.01605	1.01602
946	1.01599	1.01596	1.01593	1.01590	1.01586	1.01583	1.01580	1.01577	1.01574	1.01571
947	1.01568	1.01565	1.01562	1.01559	1.01556	1.01553	1.01550	1.01547	1.01544	1.01540
948	1.01537	1.01534	1.01531	1.01528	1.01525	1.01522	1.01519	1.01516	1.01513	1.01510
949	1.01507	1.01504	1.01501	1.01498	1.01495	1.01492	1.01489	1.01485	1.01482	1.01479
950	1.01476	1.01473	1.01470	1.01467	1.01464	1.01461	1.01458	1.01455	1.01452	1.01449
951	1.01446	1.01443	1.01440	1.01437	1.01434	1.01431	1.01428	1.01424	1.01421	1.01418
952	1.01415	1.01412	1.01409	1.01406	1.01403	1.01400	1.01397	1.01394	1.01391	1.01388
953	1.01385	1.01382	1.01379	1.01376	1.01373	1.01370	1.01367	1.01364	1.01361	1.01358
954	1.01355	1.01352	1.01348	1.01345	1.01342	1.01339	1.01336	1.01333	1.01330	1.01327
955	1.01324	1.01321	1.01318	1.01315	1.01312	1.01309	1.01306	1.01303	1.01300	1.01297
956	1.01294	1.01291	1.01288	1.01285	1.01282	1.01279	1.01276	1.01273	1.01270	1.01267

957	1.01264	1.01261	1.01258	1.01255	1.01252	1.01249	1.01246	1.01243	1.01240	1.01236
958	1.01233	1.01230	1.01227	1.01224	1.01221	1.01218	1.01215	1.01212	1.01209	1.01206
959	1.01203	1.01200	1.01197	1.01194	1.01191	1.01188	1.01185	1.01182	1.01179	1.01176
960	1.01173	1.01170	1.01167	1.01164	1.01161	1.01158	1.01155	1.01152	1.01149	1.01146
961	1.01143	1.01140	1.01137	1.01134	1.01131	1.01128	1.01125	1.01122	1.01119	1.01116
962	1.01113	1.01110	1.01107	1.01104	1.01101	1.01098	1.01095	1.01092	1.01089	1.01086
963	1.01083	1.01080	1.01077	1.01074	1.01071	1.01068	1.01065	1.01062	1.01059	1.01056
964	1.01053	1.01050	1.01047	1.01044	1.01041	1.01038	1.01035	1.01032	1.01029	1.01026
965	1.01023	1.01020	1.01017	1.01014	1.01011	1.01008	1.01005	1.01002	1.00999	1.00996
966	1.00993	1.00990	1.00987	1.00984	1.00981	1.00978	1.00975	1.00972	1.00969	1.00966
967	1.00963	1.00960	1.00957	1.00954	1.00951	1.00948	1.00945	1.00943	1.00940	1.00937
968	1.00934	1.00931	1.00928	1.00925	1.00922	1.00919	1.00916	1.00913	1.00910	1.00907
969	1.00904	1.00901	1.00898	1.00895	1.00892	1.00889	1.00886	1.00883	1.00880	1.00877
970	1.00874	1.00871	1.00868	1.00865	1.00862	1.00859	1.00856	1.00853	1.00850	1.00847
971	1.00844	1.00841	1.00838	1.00835	1.00833	1.00830	1.00827	1.00824	1.00821	1.00818
972	1.00815	1.00812	1.00809	1.00806	1.00803	1.00800	1.00797	1.00794	1.00791	1.00788
973	1.00785	1.00782	1.00779	1.00776	1.00773	1.00770	1.00767	1.00764	1.00761	1.00758
974	1.00756	1.00753	1.00750	1.00747	1.00744	1.00741	1.00738	1.00735	1.00732	1.00729
975	1.00726	1.00723	1.00720	1.00717	1.00714	1.00711	1.00708	1.00705	1.00702	1.00699
976	1.00696	1.00694	1.00691	1.00688	1.00685	1.00682	1.00679	1.00676	1.00673	1.00670
977	1.00667	1.00664	1.00661	1.00658	1.00655	1.00652	1.00649	1.00646	1.00643	1.00641
978	1.00638	1.00635	1.00632	1.00629	1.00626	1.00623	1.00620	1.00617	1.00614	1.00611
979	1.00608	1.00605	1.00602	1.00599	1.00596	1.00594	1.00591	1.00588	1.00585	1.00582
980	1.00579	1.00576	1.00573	1.00570	1.00567	1.00564	1.00561	1.00558	1.00555	1.00553
981	1.00550	1.00547	1.00544	1.00541	1.00538	1.00535	1.00532	1.00529	1.00526	1.00523
982	1.00520	1.00517	1.00514	1.00512	1.00509	1.00506	1.00503	1.00500	1.00497	1.00494
983	1.00491	1.00488	1.00485	1.00482	1.00479	1.00476	1.00474	1.00471	1.00468	1.00465
984	1.00462	1.00459	1.00456	1.00453	1.00450	1.00447	1.00444	1.00441	1.00439	1.00436
985	1.00433	1.00430	1.00427	1.00424	1.00421	1.00418	1.00415	1.00412	1.00409	1.00407
986	1.00404	1.00401	1.00398	1.00395	1.00392	1.00389	1.00386	1.00383	1.00380	1.00377
987	1.00375	1.00372	1.00369	1.00366	1.00363	1.00360	1.00357	1.00354	1.00351	1.00348
988	1.00346	1.00343	1.00340	1.00337	1.00334	1.00331	1.00328	1.00325	1.00322	1.00319
989	1.00317	1.00314	1.00311	1.00308	1.00305	1.00302	1.00299	1.00296	1.00293	1.00290
990	1.00288	1.00285	1.00282	1.00279	1.00276	1.00273	1.00270	1.00267	1.00264	1.00262
991	1.00259	1.00256	1.00253	1.00250	1.00247	1.00244	1.00241	1.00238	1.00236	1.00233
992	1.00230	1.00227	1.00224	1.00221	1.00218	1.00215	1.00212	1.00210	1.00207	1.00204
993	1.00201	1.00198	1.00195	1.00192	1.00189	1.00186	1.00184	1.00181	1.00178	1.00175
994	1.00172	1.00169	1.00166	1.00163	1.00161	1.00158	1.00155	1.00152	1.00149	1.00146
995	1.00143	1.00140	1.00138	1.00135	1.00132	1.00129	1.00126	1.00123	1.00120	1.00117
996	1.00115	1.00112	1.00109	1.00106	1.00103	1.00100	1.00097	1.00094	1.00092	1.00089
997	1.00086	1.00083	1.00080	1.00077	1.00074	1.00072	1.00069	1.00066	1.00063	1.00060
998	1.00057	1.00054	1.00051	1.00049	1.00046	1.00043	1.00040	1.00037	1.00034	1.00031
999	1.00029	1.00026	1.00023	1.00020	1.00017	1.00014	1.00011	1.00009	1.00006	1.00003
1000	1.00000	0.99997	0.99994	0.99991	0.99989	0.99986	0.99983	0.99980	0.99977	0.99974
1001	0.99971	0.99969	0.99966	0.99963	0.99960	0.99957	0.99954	0.99951	0.99949	0.99946
1002	0.99943	0.99940	0.99937	0.99934	0.99932	0.99929	0.99926	0.99923	0.99920	0.99917
1003	0.99914	0.99912	0.99909	0.99906	0.99903	0.99900	0.99897	0.99895	0.99892	0.99889
1004	0.99886	0.99883	0.99880	0.99877	0.99875	0.99872	0.99869	0.99866	0.99863	0.99860
1005	0.99858	0.99855	0.99852	0.99849	0.99846	0.99843	0.99841	0.99838	0.99835	0.99832
1006	0.99829	0.99826	0.99824	0.99821	0.99818	0.99815	0.99812	0.99809	0.99807	0.99804
1007	0.99801	0.99798	0.99795	0.99792	0.99790	0.99787	0.99784	0.99781	0.99778	0.99775
1008	0.99773	0.99770	0.99767	0.99764	0.99761	0.99758	0.99756	0.99753	0.99750	0.99747
1009	0.99744	0.99742	0.99739	0.99736	0.99733	0.99730	0.99727	0.99725	0.99722	0.99719
1010	0.99716	0.99713	0.99710	0.99708	0.99705	0.99702	0.99699	0.99696	0.99694	0.99691
1011	0.99688	0.99685	0.99682	0.99679	0.99677	0.99674	0.99671	0.99668	0.99665	0.99663
1012	0.99660	0.99657	0.99654	0.99651	0.99649	0.99646	0.99643	0.99640	0.99637	0.99634
1013	0.99632	0.99629	0.99626	0.99623	0.99620	0.99618	0.99615	0.99612	0.99609	0.99606
1014	0.99604	0.99601	0.99598	0.99595	0.99592	0.99590	0.99587	0.99584	0.99581	0.99578
1015	0.99576	0.99573	0.99570	0.99567	0.99564	0.99562	0.99559	0.99556	0.99553	0.99550
1016	0.99548	0.99545	0.99542	0.99539	0.99536	0.99534	0.99531	0.99528	0.99525	0.99522

1077	0.97903	0.97900	0.97898	0.97895	0.97893	0.97890	0.97887	0.97885	0.97882	0.97880
1078	0.97877	0.97874	0.97872	0.97869	0.97867	0.97864	0.97861	0.97859	0.97856	0.97854
1079	0.97851	0.97848	0.97846	0.97843	0.97841	0.97838	0.97835	0.97833	0.97830	0.97828
1080	0.97825	0.97823	0.97820	0.97817	0.97815	0.97812	0.97810	0.97807	0.97804	0.97802
1081	0.97799	0.97797	0.97794	0.97791	0.97789	0.97786	0.97784	0.97781	0.97779	0.97776
1082	0.97773	0.97771	0.97768	0.97766	0.97763	0.97761	0.97758	0.97755	0.97753	0.97750
1083	0.97748	0.97745	0.97742	0.97740	0.97737	0.97735	0.97732	0.97730	0.97727	0.97724
1084	0.97722	0.97719	0.97717	0.97714	0.97712	0.97709	0.97706	0.97704	0.97701	0.97699
1085	0.97696	0.97694	0.97691	0.97688	0.97686	0.97683	0.97681	0.97678	0.97676	0.97673
1086	0.97670	0.97668	0.97665	0.97663	0.97660	0.97658	0.97655	0.97652	0.97650	0.97647
1087	0.97645	0.97642	0.97640	0.97637	0.97634	0.97632	0.97629	0.97627	0.97624	0.97622
1088	0.97619	0.97616	0.97614	0.97611	0.97609	0.97606	0.97604	0.97601	0.97599	0.97596
1089	0.97593	0.97591	0.97589	0.97586	0.97583	0.97581	0.97578	0.97576	0.97573	0.97570
1090	0.97568	0.97565	0.97563	0.97560	0.97558	0.97555	0.97553	0.97550	0.97547	0.97545
1091	0.97542	0.97540	0.97537	0.97535	0.97532	0.97530	0.97527	0.97524	0.97522	0.97519
1092	0.97517	0.97514	0.97512	0.97509	0.97507	0.97504	0.97501	0.97499	0.97496	0.97494
1093	0.97491	0.97489	0.97486	0.97484	0.97481	0.97479	0.97476	0.97473	0.97471	0.97468
1094	0.97466	0.97463	0.97461	0.97458	0.97456	0.97453	0.97451	0.97448	0.97445	0.97443
1095	0.97440	0.97438	0.97435	0.97433	0.97430	0.97428	0.97425	0.97423	0.97420	0.97417
1096	0.97415	0.97412	0.97410	0.97407	0.97405	0.97402	0.97400	0.97397	0.97395	0.97392
1097	0.97390	0.97387	0.97384	0.97382	0.97379	0.97377	0.97374	0.97372	0.97369	0.97367
1098	0.97364	0.97362	0.97359	0.97357	0.97354	0.97352	0.97349	0.97346	0.97344	0.97341
1099	0.97339	0.97336	0.97334	0.97331	0.97329	0.97326	0.97324	0.97321	0.97319	0.97316
1100	0.97314	0.97311	0.97309	0.97306	0.97303	0.97301	0.97298	0.97296	0.97293	0.97291

ROSSBY PHASE SPEED

LAT	WAVE LENGTH (DEG LONG.)	WAVE NO.	PHASE SPEED (M/S)	(DEG/DAY)
5	5	72.00	0.177	0.14
5	10	36.00	0.709	0.55
5	15	24.00	1.595	1.24
5	20	18.00	2.835	2.21
5	25	14.40	4.430	3.45
5	30	12.00	6.379	4.97
5	35	10.29	8.683	6.76
5	40	9.00	11.341	8.84
5	45	8.00	14.354	11.18
5	50	7.20	17.720	13.81
5	55	6.55	21.442	16.70
5	60	6.00	25.517	19.88
5	65	5.54	29.948	23.33
5	70	5.14	34.732	27.06
5	75	4.80	39.871	31.06
5	80	4.50	45.364	35.34
5	85	4.24	51.212	39.90
5	90	4.00	57.414	44.73
5	95	3.79	63.971	49.84
5	100	3.60	70.882	55.22
5	105	3.43	78.147	60.88
5	110	3.27	85.767	66.82
5	115	3.13	93.741	73.03
5	120	3.00	102.070	79.52
5	125	2.88	110.753	86.28
5	130	2.77	119.790	93.32
5	135	2.67	129.182	100.64
5	140	2.57	138.928	108.23
5	145	2.48	149.029	116.10
5	150	2.40	159.484	124.25
5	155	2.32	170.293	132.67
5	160	2.25	181.457	141.37
5	165	2.18	192.976	150.34
5	170	2.12	204.848	159.59
5	175	2.06	217.075	169.11
5	180	2.00	229.657	178.92
10	5	72.00	0.171	0.13
10	10	36.00	0.685	0.54
10	15	24.00	1.541	1.21
10	20	18.00	2.739	2.16
10	25	14.40	4.280	3.37
10	30	12.00	6.163	4.86
10	35	10.29	8.389	6.61
10	40	9.00	10.957	8.63
10	45	8.00	13.867	10.93
10	50	7.20	17.120	13.49
10	55	6.55	20.715	16.32
10	60	6.00	24.652	19.43
10	65	5.54	28.932	22.80
10	70	5.14	33.555	26.44
10	75	4.80	38.519	30.35
10	80	4.50	43.826	34.54
10	85	4.24	49.476	38.99
10	90	4.00	55.468	43.71
10	95	3.79	61.802	48.70
10	100	3.60	68.479	53.96
10	105	3.43	75.498	59.49

10	110	3.27	82.859	65.29
10	115	3.13	90.563	71.36
10	120	3.00	98.609	77.71
10	125	2.88	106.998	84.32
10	130	2.77	115.729	91.20
10	135	2.67	124.803	98.35
10	140	2.57	134.218	105.77
10	145	2.48	143.977	113.45
10	150	2.40	154.077	121.41
10	155	2.32	164.520	129.64
10	160	2.25	175.306	138.14
10	165	2.18	186.434	146.91
10	170	2.12	197.904	155.95
10	175	2.06	209.716	165.26
10	180	2.00	221.871	174.84
15	5	72.00	0.162	0.13
15	10	36.00	0.646	0.52
15	15	24.00	1.454	1.17
15	20	18.00	2.585	2.08
15	25	14.40	4.038	3.24
15	30	12.00	5.815	4.67
15	35	10.29	7.915	6.36
15	40	9.00	10.338	8.30
15	45	8.00	13.085	10.51
15	50	7.20	16.154	12.98
15	55	6.55	19.546	15.70
15	60	6.00	23.261	18.69
15	65	5.54	27.300	21.93
15	70	5.14	31.661	25.43
15	75	4.80	36.346	29.20
15	80	4.50	41.354	33.22
15	85	4.24	46.684	37.50
15	90	4.00	52.338	42.04
15	95	3.79	58.315	46.85
15	100	3.60	64.615	51.91
15	105	3.43	71.238	57.23
15	110	3.27	78.184	62.81
15	115	3.13	85.453	68.65
15	120	3.00	93.046	74.74
15	125	2.88	100.961	81.10
15	130	2.77	109.199	87.72
15	135	2.67	117.761	94.60
15	140	2.57	126.645	101.74
15	145	2.48	135.853	109.13
15	150	2.40	145.384	116.79
15	155	2.32	155.237	124.70
15	160	2.25	165.414	132.88
15	165	2.18	175.914	141.31
15	170	2.12	186.737	150.01
15	175	2.06	197.883	158.96
15	180	2.00	209.352	168.18
20	5	72.00	0.149	0.12
20	10	36.00	0.595	0.49
20	15	24.00	1.339	1.11
20	20	18.00	2.380	1.96
20	25	14.40	3.718	3.07
20	30	12.00	5.354	4.42
20	35	10.29	7.288	6.02
20	40	9.00	9.519	7.86
20	45	8.00	12.047	9.95

20	50	7.20	14.873	12.28
20	55	6.55	17.996	14.86
20	60	6.00	21.417	17.68
20	65	5.54	25.135	20.75
20	70	5.14	29.151	24.07
20	75	4.80	33.464	27.63
20	80	4.50	38.075	31.43
20	85	4.24	42.983	35.49
20	90	4.00	48.189	39.78
20	95	3.79	53.692	44.33
20	100	3.60	59.492	49.12
20	105	3.43	65.590	54.15
20	110	3.27	71.985	59.43
20	115	3.13	78.678	64.96
20	120	3.00	85.669	70.73
20	125	2.88	92.956	76.74
20	130	2.77	100.542	83.01
20	135	2.67	108.424	89.52
20	140	2.57	116.604	96.27
20	145	2.48	125.082	103.27
20	150	2.40	133.857	110.51
20	155	2.32	142.930	118.00
20	160	2.25	152.300	125.74
20	165	2.18	161.967	133.72
20	170	2.12	171.932	141.95
20	175	2.06	182.195	150.42
20	180	2.00	192.754	159.14
25	5	72.00	0.133	0.11
25	10	36.00	0.534	0.46
25	15	24.00	1.201	1.03
25	20	18.00	2.135	1.83
25	25	14.40	3.336	2.85
25	30	12.00	4.804	4.11
25	35	10.29	6.538	5.60
25	40	9.00	8.540	7.31
25	45	8.00	10.808	9.25
25	50	7.20	13.343	11.42
25	55	6.55	16.146	13.82
25	60	6.00	19.215	16.44
25	65	5.54	22.550	19.30
25	70	5.14	26.153	22.38
25	75	4.80	30.023	25.69
25	80	4.50	34.159	29.23
25	85	4.24	38.563	33.00
25	90	4.00	43.233	37.00
25	95	3.79	48.170	41.23
25	100	3.60	53.374	45.68
25	105	3.43	58.845	50.36
25	110	3.27	64.582	55.27
25	115	3.13	70.587	60.41
25	120	3.00	76.858	65.78
25	125	2.88	83.397	71.37
25	130	2.77	90.202	77.20
25	135	2.67	97.274	83.25
25	140	2.57	104.613	89.53
25	145	2.48	112.219	96.04
25	150	2.40	120.091	102.78
25	155	2.32	128.231	109.74
25	160	2.25	136.637	116.94
25	165	2.18	145.310	124.36

25	170	2.12	154.251	132.01
25	175	2.06	163.458	139.89
25	180	2.00	172.931	148.00
30	5	72.00	0.116	0.10
30	10	36.00	0.466	0.42
30	15	24.00	1.048	0.94
30	20	18.00	1.863	1.67
30	25	14.40	2.911	2.61
30	30	12.00	4.191	3.75
30	35	10.29	5.705	5.11
30	40	9.00	7.451	6.67
30	45	8.00	9.430	8.44
30	50	7.20	11.642	10.42
30	55	6.55	14.087	12.61
30	60	6.00	16.765	15.01
30	65	5.54	19.675	17.62
30	70	5.14	22.819	20.43
30	75	4.80	26.195	23.46
30	80	4.50	29.804	26.69
30	85	4.24	33.646	30.13
30	90	4.00	37.721	33.78
30	95	3.79	42.028	37.63
30	100	3.60	46.569	41.70
30	105	3.43	51.342	45.97
30	110	3.27	56.348	50.46
30	115	3.13	61.587	55.15
30	120	3.00	67.059	60.05
30	125	2.88	72.764	65.15
30	130	2.77	78.701	70.47
30	135	2.67	84.871	76.00
30	140	2.57	91.275	81.73
30	145	2.48	97.911	87.67
30	150	2.40	104.779	93.82
30	155	2.32	111.881	100.18
30	160	2.25	119.216	106.75
30	165	2.18	126.783	113.53
30	170	2.12	134.583	120.51
30	175	2.06	142.616	127.70
30	180	2.00	150.882	135.10
35	5	72.00	0.099	0.09
35	10	36.00	0.394	0.37
35	15	24.00	0.887	0.84
35	20	18.00	1.576	1.49
35	25	14.40	2.463	2.33
35	30	12.00	3.547	3.36
35	35	10.29	4.828	4.57
35	40	9.00	6.305	5.97
35	45	8.00	7.980	7.55
35	50	7.20	9.852	9.32
35	55	6.55	11.921	11.28
35	60	6.00	14.187	13.43
35	65	5.54	16.650	15.76
35	70	5.14	19.310	18.28
35	75	4.80	22.168	20.98
35	80	4.50	25.222	23.87
35	85	4.24	28.473	26.95
35	90	4.00	31.921	30.21
35	95	3.79	35.567	33.66
35	100	3.60	39.409	37.30
35	105	3.43	43.448	41.12

35	110	3.27	47.685	45.13
35	115	3.13	52.118	49.33
35	120	3.00	56.749	53.71
35	125	2.88	61.577	58.28
35	130	2.77	66.601	63.03
35	135	2.67	71.823	67.97
35	140	2.57	77.242	73.10
35	145	2.48	82.857	78.42
35	150	2.40	88.670	83.92
35	155	2.32	94.680	89.61
35	160	2.25	100.887	95.48
35	165	2.18	107.291	101.54
35	170	2.12	113.892	107.79
35	175	2.06	120.690	114.22
35	180	2.00	127.685	120.84
40	5	72.00	0.081	0.08
40	10	36.00	0.322	0.33
40	15	24.00	0.725	0.73
40	20	18.00	1.289	1.30
40	25	14.40	2.014	2.04
40	30	12.00	2.901	2.93
40	35	10.29	3.948	3.99
40	40	9.00	5.157	5.22
40	45	8.00	6.527	6.60
40	50	7.20	8.058	8.15
40	55	6.55	9.750	9.86
40	60	6.00	11.603	11.74
40	65	5.54	13.617	13.78
40	70	5.14	15.793	15.98
40	75	4.80	18.130	18.34
40	80	4.50	20.627	20.87
40	85	4.24	23.286	23.56
40	90	4.00	26.107	26.41
40	95	3.79	29.088	29.43
40	100	3.60	32.230	32.61
40	105	3.43	35.534	35.95
40	110	3.27	38.999	39.46
40	115	3.13	42.625	43.12
40	120	3.00	46.412	46.96
40	125	2.88	50.360	50.95
40	130	2.77	54.469	55.11
40	135	2.67	58.740	59.43
40	140	2.57	63.171	63.91
40	145	2.48	67.764	68.56
40	150	2.40	72.518	73.37
40	155	2.32	77.433	78.34
40	160	2.25	82.509	83.48
40	165	2.18	87.747	88.78
40	170	2.12	93.145	94.24
40	175	2.06	98.705	99.86
40	180	2.00	104.426	105.65
45	5	72.00	0.063	0.07
45	10	36.00	0.253	0.28
45	15	24.00	0.570	0.62
45	20	18.00	1.014	1.11
45	25	14.40	1.584	1.74
45	30	12.00	2.281	2.50
45	35	10.29	3.105	3.40
45	40	9.00	4.056	4.44
45	45	8.00	5.133	5.62

45	50	7.20	6.337	6.94
45	55	6.55	7.660	8.40
45	60	6.00	9.126	10.00
45	65	5.54	10.710	11.74
45	70	5.14	12.421	13.61
45	75	4.80	14.259	15.62
45	80	4.50	16.223	17.78
45	85	4.24	18.314	20.07
45	90	4.00	20.532	22.50
45	95	3.79	22.877	25.07
45	100	3.60	25.349	27.78
45	105	3.43	27.947	30.62
45	110	3.27	30.672	33.61
45	115	3.13	33.524	36.73
45	120	3.00	36.502	40.00
45	125	2.88	39.607	43.40
45	130	2.77	42.839	46.94
45	135	2.67	46.198	50.62
45	140	2.57	49.684	54.44
45	145	2.48	53.296	58.40
45	150	2.40	57.035	62.50
45	155	2.32	60.900	66.73
45	160	2.25	64.893	71.11
45	165	2.18	69.012	75.62
45	170	2.12	73.258	80.27
45	175	2.06	77.631	85.06
45	180	2.00	82.130	89.99
50	5	72.00	0.048	0.06
50	10	36.00	0.190	0.23
50	15	24.00	0.428	0.52
50	20	18.00	0.762	0.92
50	25	14.40	1.190	1.43
50	30	12.00	1.714	2.07
50	35	10.29	2.333	2.81
50	40	9.00	3.047	3.67
50	45	8.00	3.856	4.65
50	50	7.20	4.760	5.74
50	55	6.55	5.760	6.94
50	60	6.00	6.855	8.26
50	65	5.54	8.045	9.69
50	70	5.14	9.330	11.24
50	75	4.80	10.711	12.91
50	80	4.50	12.187	14.69
50	85	4.24	13.758	16.58
50	90	4.00	15.424	18.59
50	95	3.79	17.185	20.71
50	100	3.60	19.042	22.95
50	105	3.43	20.993	25.30
50	110	3.27	23.040	27.76
50	115	3.13	25.183	30.35
50	120	3.00	27.420	33.04
50	125	2.88	29.753	35.85
50	130	2.77	32.180	38.78
50	135	2.67	34.703	41.82
50	140	2.57	37.322	44.97
50	145	2.48	40.035	48.24
50	150	2.40	42.844	51.63
50	155	2.32	45.748	55.13
50	160	2.25	48.747	58.74
50	165	2.18	51.841	62.47

50	170	2.12	55.030	66.31
50	175	2.06	58.315	70.27
50	180	2.00	61.695	74.34
55	5	72.00	0.034	0.05
55	10	36.00	0.135	0.18
55	15	24.00	0.304	0.41
55	20	18.00	0.541	0.73
55	25	14.40	0.846	1.14
55	30	12.00	1.218	1.64
55	35	10.29	1.657	2.24
55	40	9.00	2.165	2.92
55	45	8.00	2.740	3.70
55	50	7.20	3.382	4.57
55	55	6.55	4.093	5.53
55	60	6.00	4.871	6.58
55	65	5.54	5.716	7.72
55	70	5.14	6.629	8.95
55	75	4.80	7.610	10.27
55	80	4.50	8.659	11.69
55	85	4.24	9.775	13.20
55	90	4.00	10.959	14.79
55	95	3.79	12.210	16.48
55	100	3.60	13.529	18.27
55	105	3.43	14.916	20.14
55	110	3.27	16.370	22.10
55	115	3.13	17.893	24.16
55	120	3.00	19.482	26.30
55	125	2.88	21.140	28.54
55	130	2.77	22.865	30.87
55	135	2.67	24.657	33.29
55	140	2.57	26.517	35.80
55	145	2.48	28.445	38.40
55	150	2.40	30.441	41.10
55	155	2.32	32.504	43.88
55	160	2.25	34.635	46.76
55	165	2.18	36.834	49.73
55	170	2.12	39.100	52.79
55	175	2.06	41.434	55.94
55	180	2.00	43.835	59.18
60	5	72.00	0.022	0.03
60	10	36.00	0.090	0.14
60	15	24.00	0.202	0.31
60	20	18.00	0.358	0.56
60	25	14.40	0.560	0.87
60	30	12.00	0.807	1.25
60	35	10.29	1.098	1.70
60	40	9.00	1.434	2.22
60	45	8.00	1.815	2.81
60	50	7.20	2.241	3.47
60	55	6.55	2.711	4.20
60	60	6.00	3.226	5.00
60	65	5.54	3.787	5.86
60	70	5.14	4.391	6.80
60	75	4.80	5.041	7.81
60	80	4.50	5.736	8.88
60	85	4.24	6.475	10.03
60	90	4.00	7.259	11.24
60	95	3.79	8.088	12.52
60	100	3.60	8.962	13.88
60	105	3.43	9.881	15.30

60	110	3.27	10.844	16.79
60	115	3.13	11.852	18.35
60	120	3.00	12.905	19.98
60	125	2.88	14.003	21.68
60	130	2.77	15.146	23.45
60	135	2.67	16.334	25.29
60	140	2.57	17.566	27.20
60	145	2.48	18.843	29.17
60	150	2.40	20.165	31.22
60	155	2.32	21.532	33.34
60	160	2.25	22.943	35.52
60	165	2.18	24.399	37.78
60	170	2.12	25.901	40.10
60	175	2.06	27.447	42.50
60	180	2.00	29.037	44.96
65	5	72.00	0.014	0.02
65	10	36.00	0.054	0.10
65	15	24.00	0.122	0.22
65	20	18.00	0.216	0.40
65	25	14.40	0.338	0.62
65	30	12.00	0.487	0.89
65	35	10.29	0.663	1.21
65	40	9.00	0.866	1.59
65	45	8.00	1.096	2.01
65	50	7.20	1.353	2.48
65	55	6.55	1.637	3.00
65	60	6.00	1.948	3.57
65	65	5.54	2.287	4.19
65	70	5.14	2.652	4.86
65	75	4.80	3.044	5.57
65	80	4.50	3.464	6.34
65	85	4.24	3.910	7.16
65	90	4.00	4.384	8.03
65	95	3.79	4.884	8.94
65	100	3.60	5.412	9.91
65	105	3.43	5.967	10.93
65	110	3.27	6.548	11.99
65	115	3.13	7.157	13.11
65	120	3.00	7.793	14.27
65	125	2.88	8.456	15.49
65	130	2.77	9.146	16.75
65	135	2.67	9.863	18.06
65	140	2.57	10.607	19.43
65	145	2.48	11.378	20.84
65	150	2.40	12.177	22.30
65	155	2.32	13.002	23.81
65	160	2.25	13.854	25.37
65	165	2.18	14.734	26.98
65	170	2.12	15.640	28.64
65	175	2.06	16.574	30.35
65	180	2.00	17.534	32.11
70	5	72.00	0.007	0.02
70	10	36.00	0.029	0.06
70	15	24.00	0.065	0.15
70	20	18.00	0.115	0.26
70	25	14.40	0.179	0.41
70	30	12.00	0.258	0.58
70	35	10.29	0.351	0.80
70	40	9.00	0.459	1.04
70	45	8.00	0.581	1.31

70	50	7.20	0.717	1.62
70	55	6.55	0.868	1.96
70	60	6.00	1.033	2.34
70	65	5.54	1.212	2.74
70	70	5.14	1.406	3.18
70	75	4.80	1.614	3.65
70	80	4.50	1.836	4.15
70	85	4.24	2.073	4.69
70	90	4.00	2.323	5.26
70	95	3.79	2.589	5.86
70	100	3.60	2.869	6.49
70	105	3.43	3.163	7.16
70	110	3.27	3.471	7.85
70	115	3.13	3.794	8.58
70	120	3.00	4.131	9.35
70	125	2.88	4.482	10.14
70	130	2.77	4.848	10.97
70	135	2.67	5.228	11.83
70	140	2.57	5.622	12.72
70	145	2.48	6.031	13.64
70	150	2.40	6.454	14.60
70	155	2.32	6.892	15.59
70	160	2.25	7.343	16.61
70	165	2.18	7.810	17.67
70	170	2.12	8.290	18.76
70	175	2.06	8.785	19.88
70	180	2.00	9.294	21.03
75	5	72.00	0.003	0.01
75	10	36.00	0.012	0.04
75	15	24.00	0.028	0.08
75	20	18.00	0.050	0.15
75	25	14.40	0.078	0.23
75	30	12.00	0.112	0.33
75	35	10.29	0.152	0.46
75	40	9.00	0.199	0.59
75	45	8.00	0.252	0.75
75	50	7.20	0.311	0.93
75	55	6.55	0.376	1.12
75	60	6.00	0.447	1.34
75	65	5.54	0.525	1.57
75	70	5.14	0.609	1.82
75	75	4.80	0.699	2.09
75	80	4.50	0.796	2.38
75	85	4.24	0.898	2.68
75	90	4.00	1.007	3.01
75	95	3.79	1.122	3.35
75	100	3.60	1.243	3.72
75	105	3.43	1.370	4.10
75	110	3.27	1.504	4.50
75	115	3.13	1.644	4.91
75	120	3.00	1.790	5.35
75	125	2.88	1.942	5.81
75	130	2.77	2.101	6.28
75	135	2.67	2.265	6.77
75	140	2.57	2.436	7.28
75	145	2.48	2.614	7.81
75	150	2.40	2.797	8.36
75	155	2.32	2.986	8.93
75	160	2.25	3.182	9.51
75	165	2.18	3.384	10.12

75	170	2.12	3.592	10.74
75	175	2.06	3.807	11.38
75	180	2.00	4.027	12.04
80	5	72.00	0.001	0.00
80	10	36.00	0.004	0.02
80	15	24.00	0.008	0.04
80	20	18.00	0.015	0.07
80	25	14.40	0.023	0.10
80	30	12.00	0.034	0.15
80	35	10.29	0.046	0.20
80	40	9.00	0.060	0.27
80	45	8.00	0.076	0.34
80	50	7.20	0.094	0.42
80	55	6.55	0.114	0.51
80	60	6.00	0.135	0.60
80	65	5.54	0.159	0.71
80	70	5.14	0.184	0.82
80	75	4.80	0.211	0.94
80	80	4.50	0.240	1.07
80	85	4.24	0.271	1.21
80	90	4.00	0.304	1.35
80	95	3.79	0.339	1.51
80	100	3.60	0.375	1.67
80	105	3.43	0.414	1.84
80	110	3.27	0.454	2.02
80	115	3.13	0.496	2.21
80	120	3.00	0.541	2.41
80	125	2.88	0.587	2.61
80	130	2.77	0.634	2.83
80	135	2.67	0.684	3.05
80	140	2.57	0.736	3.28
80	145	2.48	0.789	3.52
80	150	2.40	0.845	3.76
80	155	2.32	0.902	4.02
80	160	2.25	0.961	4.28
80	165	2.18	1.022	4.55
80	170	2.12	1.085	4.83
80	175	2.06	1.150	5.12
80	180	2.00	1.216	5.42
85	5	72.00	0.000	0.00
85	10	36.00	0.000	0.00
85	15	24.00	0.001	0.01
85	20	18.00	0.002	0.02
85	25	14.40	0.003	0.03
85	30	12.00	0.004	0.04
85	35	10.29	0.006	0.05
85	40	9.00	0.008	0.07
85	45	8.00	0.010	0.09
85	50	7.20	0.012	0.11
85	55	6.55	0.014	0.13
85	60	6.00	0.017	0.15
85	65	5.54	0.020	0.18
85	70	5.14	0.023	0.21
85	75	4.80	0.027	0.24
85	80	4.50	0.030	0.27
85	85	4.24	0.034	0.30
85	90	4.00	0.038	0.34
85	95	3.79	0.043	0.38
85	100	3.60	0.047	0.42
85	105	3.43	0.052	0.46

85	110	3.27	0.057	0.51
85	115	3.13	0.063	0.56
85	120	3.00	0.068	0.61
85	125	2.88	0.074	0.66
85	130	2.77	0.080	0.71
85	135	2.67	0.087	0.77
85	140	2.57	0.093	0.83
85	145	2.48	0.100	0.89
85	150	2.40	0.107	0.95
85	155	2.32	0.114	1.01
85	160	2.25	0.122	1.08
85	165	2.18	0.129	1.15
85	170	2.12	0.137	1.22
85	175	2.06	0.145	1.29
85	180	2.00	0.154	1.36

LATITUDINAL PROPERTIES

DEG LAT	CORIOLIS (SEC.E-1)	BETA (CM.E-1*SEC.E-1)	RADIAL DIST (CM.)
0	0.	.22891E-12	.63712E+09
1	.25453E-05	.22887E-12	.63703E+09
2	.50898E-05	.22877E-12	.63673E+09
3	.76328E-05	.22859E-12	.63625E+09
4	.10173E-04	.22835E-12	.63557E+09
5	.12711E-04	.22804E-12	.63470E+09
6	.15245E-04	.22765E-12	.63363E+09
7	.17774E-04	.22720E-12	.63237E+09
8	.20297E-04	.22668E-12	.63092E+09
9	.22815E-04	.22609E-12	.62928E+09
10	.25325E-04	.22543E-12	.62744E+09
11	.27828E-04	.22470E-12	.62542E+09
12	.30322E-04	.22391E-12	.62320E+09
13	.32807E-04	.22304E-12	.62079E+09
14	.35282E-04	.22211E-12	.61820E+09
15	.37747E-04	.22111E-12	.61541E+09
16	.40200E-04	.22004E-12	.61244E+09
17	.42640E-04	.21891E-12	.60928E+09
18	.45068E-04	.21770E-12	.60594E+09
19	.47482E-04	.21644E-12	.60241E+09
20	.49881E-04	.21510E-12	.59870E+09
21	.52265E-04	.21370E-12	.59481E+09
22	.54633E-04	.21224E-12	.59073E+09
23	.56985E-04	.21071E-12	.58647E+09
24	.59319E-04	.20912E-12	.58204E+09
25	.61636E-04	.20746E-12	.57743E+09
26	.63933E-04	.20574E-12	.57264E+09
27	.66211E-04	.20396E-12	.56768E+09
28	.68469E-04	.20211E-12	.56255E+09
29	.70706E-04	.20021E-12	.55724E+09
30	.72921E-04	.19824E-12	.55176E+09
31	.75114E-04	.19621E-12	.54612E+09
32	.77285E-04	.19412E-12	.54031E+09
33	.79431E-04	.19198E-12	.53434E+09
34	.81554E-04	.18977E-12	.52820E+09
35	.83652E-04	.18751E-12	.52190E+09
36	.85724E-04	.18519E-12	.51544E+09
37	.87770E-04	.18281E-12	.50883E+09
38	.89789E-04	.18038E-12	.50206E+09
39	.91782E-04	.17789E-12	.49514E+09
40	.93746E-04	.17535E-12	.48806E+09
41	.95681E-04	.17276E-12	.48084E+09
42	.97588E-04	.17011E-12	.47347E+09
43	.99464E-04	.16741E-12	.46596E+09
44	.10131E-03	.16466E-12	.45831E+09
45	.10313E-03	.16186E-12	.45051E+09
46	.10491E-03	.15901E-12	.44258E+09
47	.10666E-03	.15611E-12	.43452E+09
48	.10838E-03	.15317E-12	.42632E+09
49	.11007E-03	.15018E-12	.41799E+09
50	.11172E-03	.14714E-12	.40953E+09
51	.11334E-03	.14406E-12	.40095E+09
52	.11493E-03	.14093E-12	.39225E+09
53	.11647E-03	.13776E-12	.38343E+09
54	.11799E-03	.13455E-12	.37449E+09
55	.11947E-03	.13130E-12	.36544E+09
56	.12091E-03	.12800E-12	.35627E+09

57	.12231E-03	.12467E-12	.34700E+09
58	.12368E-03	.12130E-12	.33762E+09
59	.12501E-03	.11790E-12	.32814E+09
60	.12630E-03	.11445E-12	.31856E+09
61	.12756E-03	.11098E-12	.30888E+09
62	.12877E-03	.10747E-12	.29911E+09
63	.12995E-03	.10392E-12	.28925E+09
64	.13108E-03	.10035E-12	.27930E+09
65	.13218E-03	.96741E-13	.26926E+09
66	.13323E-03	.93105E-13	.25914E+09
67	.13425E-03	.89441E-13	.24894E+09
68	.13522E-03	.85750E-13	.23867E+09
69	.13616E-03	.82033E-13	.22832E+09
70	.13705E-03	.78291E-13	.21791E+09
71	.13790E-03	.74525E-13	.20743E+09
72	.13870E-03	.70736E-13	.19688E+09
73	.13947E-03	.66926E-13	.18628E+09
74	.14019E-03	.63096E-13	.17561E+09
75	.14087E-03	.59246E-13	.16490E+09
76	.14151E-03	.55378E-13	.15413E+09
77	.14210E-03	.51493E-13	.14332E+09
78	.14266E-03	.47593E-13	.13247E+09
79	.14316E-03	.43678E-13	.12157E+09
80	.14363E-03	.39749E-13	.11064E+09
81	.14405E-03	.35809E-13	.99668E+08
82	.14442E-03	.31858E-13	.88670E+08
83	.14476E-03	.27897E-13	.77646E+08
84	.14504E-03	.23927E-13	.66597E+08
85	.14529E-03	.19951E-13	.55529E+08
86	.14549E-03	.15968E-13	.44443E+08
87	.14564E-03	.11980E-13	.33344E+08
88	.14575E-03	.79888E-14	.22235E+08
89	.14582E-03	.39950E-14	.11112E+08
90	.14584E-03	-.27443E-23	-.76382E-02

INERTIAL CIRCLE

LAT	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80
1	1964.4	3928.8	5893.2	7857.6	9822.0	11786.4	13750.8	15715.2	17679.6	19644.1	21608.5	23572.9	25537.3	27501.7	29466.1	31430.5
2	982.4	1964.7	2947.1	3929.4	4911.8	5894.1	6876.5	7858.8	8841.2	9823.5	10805.9	11788.2	12770.6	13752.9	14735.3	15717.6
3	655.1	1310.1	1965.2	2620.3	3275.3	3930.4	4585.5	5240.5	5895.6	6550.7	7205.7	7860.8	8515.9	9170.9	9826.0	10481.1
4	491.5	983.0	1474.4	1965.9	2457.4	2948.9	3440.3	3931.8	4423.3	4914.8	5406.2	5897.7	6389.2	6880.7	7372.1	7863.6
5	393.4	786.7	1180.1	1573.4	1966.8	2360.2	2753.5	3146.9	3540.2	3933.6	4327.0	4720.3	5113.7	5507.0	5900.4	6293.8
6	328.0	656.0	984.0	1311.9	1639.9	1967.9	2295.9	2623.9	2951.9	3279.8	3607.8	3935.8	4263.8	4591.8	4919.8	5247.7
7	281.3	562.6	843.9	1125.3	1406.6	1687.9	1969.2	2250.5	2531.8	2813.1	3094.5	3375.8	3657.1	3938.4	4219.7	4501.0
8	246.3	492.7	739.0	985.4	1231.7	1478.0	1724.4	1970.7	2217.0	2463.4	2709.7	2956.1	3202.4	3448.7	3695.1	3941.4
9	219.2	438.3	657.5	876.6	1095.8	1314.9	1534.1	1753.3	1972.4	2191.6	2410.7	2629.9	2849.0	3068.2	3287.3	3506.5
10	197.4	394.9	592.3	789.7	987.2	1184.6	1382.0	1579.5	1776.9	1974.3	2171.7	2369.2	2566.6	2764.0	2961.5	3158.9
11	179.7	359.3	539.0	718.7	898.4	1078.0	1257.7	1437.4	1617.1	1796.7	1976.4	2156.1	2335.8	2515.4	2695.1	2874.8
12	164.9	329.8	494.7	659.6	824.5	989.4	1154.3	1319.2	1484.1	1649.0	1813.8	1978.7	2143.6	2308.5	2473.4	2638.3
13	152.4	304.8	457.2	609.6	762.0	914.4	1066.8	1219.2	1371.6	1524.0	1676.5	1828.9	1981.3	2133.7	2286.1	2438.5
14	141.7	283.4	425.1	566.9	708.6	850.3	992.0	1133.7	1275.4	1417.1	1558.8	1700.6	1842.3	1984.0	2125.7	2267.4
15	132.5	264.9	397.4	529.8	662.3	794.8	927.2	1059.7	1192.2	1324.6	1457.1	1589.5	1722.0	1854.5	1986.9	2119.4
16	124.4	248.8	373.1	497.5	621.9	746.3	870.7	995.0	1119.4	1243.8	1368.2	1492.6	1616.9	1741.3	1865.7	1990.1
17	117.3	234.5	351.8	469.0	586.3	703.6	820.8	938.1	1055.3	1172.6	1289.9	1407.1	1524.4	1641.6	1758.9	1876.2
18	110.9	221.9	332.8	443.8	554.7	665.7	776.6	887.6	998.5	1109.4	1220.4	1331.3	1442.3	1553.2	1664.2	1775.1
19	105.3	210.6	315.9	421.2	526.5	631.8	737.1	842.4	947.7	1053.0	1158.3	1263.6	1369.0	1474.3	1579.6	1684.9
20	100.2	200.5	300.7	401.0	501.2	601.4	701.7	801.9	902.1	1002.4	1102.6	1202.9	1303.1	1403.3	1503.6	1603.8
21	95.7	191.3	287.0	382.7	478.3	574.0	669.7	765.3	861.0	956.7	1052.3	1148.0	1243.7	1339.3	1435.0	1530.7
22	91.5	183.0	274.6	366.1	457.6	549.1	640.6	732.2	823.7	915.2	1006.7	1098.2	1189.7	1281.3	1372.8	1464.3
23	87.7	175.5	263.2	351.0	438.7	526.5	614.2	701.9	789.7	877.4	965.2	1052.9	1140.6	1228.4	1316.1	1403.9
24	84.3	168.6	252.9	337.2	421.4	505.7	590.0	674.3	758.6	842.9	927.2	1011.5	1095.8	1180.1	1264.3	1348.6
25	81.1	162.2	243.4	324.5	405.6	486.7	567.9	649.0	730.1	811.2	892.3	973.5	1054.6	1135.7	1216.8	1298.0
26	78.2	156.4	234.6	312.8	391.0	469.2	547.4	625.7	703.9	782.1	860.3	938.5	1016.7	1094.9	1173.1	1251.3
27	75.5	151.0	226.5	302.1	377.6	453.1	528.6	604.1	679.6	755.2	830.7	906.2	981.7	1057.2	1132.7	1208.3
28	73.0	146.1	219.1	292.1	365.1	438.2	511.2	584.2	657.2	730.3	803.3	876.3	949.3	1022.4	1095.4	1168.4
29	70.7	141.4	212.1	282.9	353.6	424.3	495.0	565.7	636.4	707.2	777.9	848.6	919.3	990.0	1060.7	1131.4
30	68.6	137.1	205.7	274.3	342.8	411.4	480.0	548.5	617.1	685.7	754.2	822.8	891.4	959.9	1028.5	1097.1
31	66.6	133.1	199.7	266.3	332.8	399.4	466.0	532.5	599.1	665.7	732.2	798.8	865.3	931.9	998.5	1065.0
32	64.7	129.4	194.1	258.8	323.5	388.2	452.9	517.6	582.3	647.0	711.7	776.4	841.0	905.7	970.4	1035.1
33	62.9	125.9	188.8	251.8	314.7	377.7	440.6	503.6	566.5	629.5	692.4	755.4	818.3	881.3	944.2	1007.2
34	61.3	122.6	183.9	245.2	306.5	367.9	429.2	490.5	551.8	613.1	674.4	735.7	797.0	858.3	919.6	980.9
35	59.8	119.5	179.3	239.1	298.9	358.6	418.4	478.2	537.9	597.7	657.5	717.3	777.0	836.8	896.6	956.3
36	58.3	116.7	175.0	233.3	291.6	350.0	408.3	466.6	524.9	583.3	641.6	699.9	758.2	816.6	874.9	933.2
37	57.0	113.9	170.9	227.9	284.8	341.8	398.8	455.7	512.7	569.7	626.6	683.6	740.6	797.5	854.5	911.5
38	55.7	111.4	167.1	222.7	278.4	334.1	389.8	445.5	501.2	556.9	612.5	668.2	723.9	779.6	835.3	891.0
39	54.5	109.0	163.4	217.9	272.4	326.9	381.3	435.8	490.3	544.8	599.2	653.7	708.2	762.7	817.2	871.6
40	53.3	106.7	160.0	213.3	266.7	320.0	373.4	426.7	480.0	533.4	586.7	640.0	693.4	746.7	800.0	853.4
41	52.3	104.5	156.8	209.0	261.3	313.5	365.8	418.1	470.3	522.6	574.8	627.1	679.3	731.6	783.9	836.1
42	51.2	102.5	153.7	204.9	256.2	307.4	358.7	409.9	461.1	512.4	563.6	614.8	666.1	717.3	768.5	819.8
43	50.3	100.5	150.8	201.1	251.3	301.6	351.9	402.2	452.4	502.7	553.0	603.2	653.5	703.8	754.0	804.3
44	49.4	98.7	148.1	197.4	246.8	296.1	345.5	394.8	444.2	493.5	542.9	592.2	641.6	690.9	740.3	789.7
45	48.5	97.0	145.5	193.9	242.4	290.9	339.4	387.9	436.4	484.8	533.3	581.8	630.3	678.8	727.3	775.7
46	47.7	95.3	143.0	190.6	238.3	286.0	333.6	381.3	428.9	476.6	524.3	571.9	619.6	667.2	714.9	762.6
47	46.9	93.8	140.6	187.5	234.4	281.3	328.1	375.0	421.9	468.8	515.6	562.5	609.4	656.3	703.2	750.0
48	46.1	92.3	138.4	184.5	230.7	276.8	322.9	369.1	415.2	461.3	507.5	553.6	599.7	645.9	692.0	738.1
49	45.4	90.9	136.3	181.7	227.1	272.6	318.0	363.4	408.8	454.3	499.7	545.1	590.5	636.0	681.4	726.8
50	44.8	89.5	134.3	179.0	223.8	268.5	313.3	358.0	402.8	447.5	492.3	537.0	581.8	626.6	671.3	716.1
51	44.1	88.2	132.3	176.5	220.6	264.7	308.8	352.9	397.0	441.1	485.3	529.4	573.5	617.6	661.7	705.8
52	43.5	87.0	130.5	174.0	217.5	261.0	304.5	348.1	391.6	435.1	478.6	522.1	565.6	609.1	652.6	696.1
53	42.9	85.9	128.8	171.7	214.6	257.6	300.5	343.4	386.3	429.3	472.2	515.1	558.1	601.0	643.9	686.8
54	42.4	84.8	127.1	169.5	211.9	254.3	296.6	339.0	381.4	423.8	466.1	508.5	550.9	593.3	635.7	678.0
55	41.9	83.7	125.6	167.4	209.3	251.1	293.0	334.8	376.7	418.5	460.4	502.2	544.1	585.9	627.8	669.6
56	41.4	82.7	124.1	165.4	206.8	248.1	289.5	330.8	372.2	413.5	454.9	496.2	537.6	578.9	620.3	661.7
57	40.9	81.8	122.6	163.5	204.4	245.3	286.1	327.0	367.9	408.8	449.7	490.5	531.4	572.3	613.2	654.1
58	40.4	80.9	121.3	161.7	202.1	242.6	283.0	323.4	363.8	404.3	444.7	485.1	525.5	566.0	606.4	646.8

59	40.0	80.0	120.0	160.0	200.0	240.0	280.0	320.0	360.0	400.0	440.0	480.0	520.0	559.9	599.9	639.9
60	39.6	79.2	118.8	158.3	197.9	237.5	277.1	316.7	356.3	395.9	435.5	475.0	514.6	554.2	593.8	633.4
61	39.2	78.4	117.6	156.8	196.0	235.2	274.4	313.6	352.8	392.0	431.2	470.4	509.6	548.8	588.0	627.2
62	38.8	77.7	116.5	155.3	194.1	233.0	271.8	310.6	349.5	388.3	427.1	465.9	504.8	543.6	582.4	621.3
63	38.5	77.0	115.4	153.9	192.4	230.9	269.3	307.8	346.3	384.8	423.3	461.7	500.2	538.7	577.2	615.6
64	38.1	76.3	114.4	152.6	190.7	228.9	267.0	305.2	343.3	381.4	419.6	457.7	495.9	534.0	572.2	610.3
65	37.8	75.7	113.5	151.3	189.1	227.0	264.8	302.6	340.4	378.3	416.1	453.9	491.8	529.6	567.4	605.2
66	37.5	75.1	112.6	150.1	187.6	225.2	262.7	300.2	337.8	375.3	412.8	450.3	487.9	525.4	562.9	600.4
67	37.2	74.5	111.7	149.0	186.2	223.5	260.7	298.0	335.2	372.4	409.7	446.9	484.2	521.4	558.7	595.9
68	37.0	74.0	110.9	147.9	184.9	221.9	258.8	295.8	332.8	369.8	406.7	443.7	480.7	517.7	554.6	591.6
69	36.7	73.4	110.2	146.9	183.6	220.3	257.1	293.8	330.5	367.2	403.9	440.7	477.4	514.1	550.8	587.6
70	36.5	73.0	109.5	145.9	182.4	218.9	255.4	291.9	328.4	364.8	401.3	437.8	474.3	510.8	547.3	583.7
71	36.3	72.5	108.8	145.0	181.3	217.6	253.8	290.1	326.3	362.6	398.8	435.1	471.4	507.6	543.9	580.1
72	36.0	72.1	108.1	144.2	180.2	216.3	252.3	288.4	324.4	360.5	396.5	432.6	468.6	504.7	540.7	576.8
73	35.9	71.7	107.6	143.4	179.3	215.1	251.0	286.8	322.7	358.5	394.4	430.2	466.1	501.9	537.8	573.6
74	35.7	71.3	107.0	142.7	178.3	214.0	249.7	285.3	321.0	356.7	392.3	428.0	463.6	499.3	535.0	570.6
75	35.5	71.0	106.5	142.0	177.5	213.0	248.5	283.9	319.4	354.9	390.4	425.9	461.4	496.9	532.4	567.9
76	35.3	70.7	106.0	141.3	176.7	212.0	247.3	282.7	318.0	353.3	388.7	424.0	459.3	494.7	530.0	565.3
77	35.2	70.4	105.6	140.7	175.9	211.1	246.3	281.5	316.7	351.9	387.0	422.2	457.4	492.6	527.8	563.0
78	35.0	70.1	105.1	140.2	175.2	210.3	245.3	280.4	315.4	350.5	385.5	420.6	455.6	490.7	525.7	560.8
79	34.9	69.9	104.8	139.7	174.6	209.6	244.5	279.4	314.3	349.3	384.2	419.1	454.0	489.0	523.9	558.8
80	34.8	69.6	104.4	139.2	174.1	208.9	243.7	278.5	313.3	348.1	382.9	417.7	452.6	487.4	522.2	557.0
81	34.7	69.4	104.1	138.8	173.6	208.3	243.0	277.7	312.4	347.1	381.8	416.5	451.2	486.0	520.7	555.4
82	34.6	69.2	103.9	138.5	173.1	207.7	242.3	277.0	311.6	346.2	380.8	415.4	450.1	484.7	519.3	553.9
83	34.5	69.1	103.6	138.2	172.7	207.2	241.8	276.3	310.9	345.4	380.0	414.5	449.0	483.6	518.1	552.7
84	34.5	68.9	103.4	137.9	172.4	206.8	241.3	275.8	310.3	344.7	379.2	413.7	448.1	482.6	517.1	551.6
85	34.4	68.8	103.2	137.7	172.1	206.5	240.9	275.3	309.7	344.1	378.6	413.0	447.4	481.8	516.2	550.6
86	34.4	68.7	103.1	137.5	171.8	206.2	240.6	274.9	309.3	343.7	378.0	412.4	446.8	481.1	515.5	549.9
87	34.3	68.7	103.0	137.3	171.7	206.0	240.3	274.6	309.0	343.3	377.6	412.0	446.3	480.6	515.0	549.3
88	34.3	68.6	102.9	137.2	171.5	205.8	240.1	274.4	308.7	343.0	377.3	411.7	446.0	480.3	514.6	548.9
89	34.3	68.6	102.9	137.2	171.4	205.7	240.0	274.3	308.6	342.9	377.2	411.5	445.8	480.0	514.3	548.6
90	34.3	68.6	102.9	137.1	171.4	205.7	240.0	274.3	308.6	342.8	377.1	411.4	445.7	480.0	514.3	548.5

TRIGONOMETRIC VALUES

DEG	RAD	SIN	COS	TAN
0	0.00000	0.00000	1.00000	0.00000
1	0.01745	0.01745	0.99985	0.01746
2	0.03491	0.03490	0.99939	0.03492
3	0.05236	0.05234	0.99863	0.05241
4	0.06981	0.06976	0.99756	0.06993
5	0.08727	0.08716	0.99619	0.08749
6	0.10472	0.10453	0.99452	0.10510
7	0.12217	0.12187	0.99255	0.12278
8	0.13963	0.13917	0.99027	0.14054
9	0.15708	0.15643	0.98769	0.15838
10	0.17453	0.17365	0.98481	0.17633
11	0.19199	0.19081	0.98163	0.19438
12	0.20944	0.20791	0.97815	0.21256
13	0.22689	0.22495	0.97437	0.23087
14	0.24435	0.24192	0.97030	0.24933
15	0.26180	0.25882	0.96593	0.26795
16	0.27925	0.27564	0.96126	0.28675
17	0.29671	0.29237	0.95630	0.30573
18	0.31416	0.30902	0.95106	0.32492
19	0.33161	0.32557	0.94552	0.34433
20	0.34907	0.34202	0.93969	0.36397
21	0.36652	0.35837	0.93358	0.38386
22	0.38397	0.37461	0.92718	0.40403
23	0.40143	0.39073	0.92050	0.42447
24	0.41888	0.40674	0.91355	0.44523
25	0.43633	0.42262	0.90631	0.46631
26	0.45379	0.43837	0.89879	0.48773
27	0.47124	0.45399	0.89101	0.50953
28	0.48869	0.46947	0.88295	0.53171
29	0.50615	0.48481	0.87462	0.55431
30	0.52360	0.50000	0.86603	0.57735
31	0.54105	0.51504	0.85717	0.60086
32	0.55851	0.52992	0.84805	0.62487
33	0.57596	0.54464	0.83867	0.64941
34	0.59341	0.55919	0.82904	0.67451
35	0.61087	0.57358	0.81915	0.70021
36	0.62832	0.58779	0.80902	0.72654
37	0.64577	0.60182	0.79864	0.75355
38	0.66323	0.61566	0.78801	0.78129
39	0.68068	0.62932	0.77715	0.80978
40	0.69813	0.64279	0.76604	0.83910
41	0.71558	0.65606	0.75471	0.86929
42	0.73304	0.66913	0.74314	0.90040
43	0.75049	0.68200	0.73135	0.93252
44	0.76794	0.69466	0.71934	0.96569
45	0.78540	0.70711	0.70711	1.00000
46	0.80285	0.71934	0.69466	1.03553
47	0.82030	0.73135	0.68200	1.07237
48	0.83776	0.74314	0.66913	1.11061
49	0.85521	0.75471	0.65606	1.15037
50	0.87266	0.76604	0.64279	1.19175
51	0.89012	0.77715	0.62932	1.23490
52	0.90757	0.78801	0.61566	1.27994
53	0.92502	0.79864	0.60182	1.32704
54	0.94248	0.80902	0.58779	1.37638
55	0.95993	0.81915	0.57358	1.42815
56	0.97738	0.82904	0.55919	1.48256
57	0.99484	0.83867	0.54464	1.53986

58	1.01229	0.84805	0.52992	1.60033
59	1.02974	0.85717	0.51504	1.66428
60	1.04720	0.86603	0.50000	1.73205
61	1.06465	0.87462	0.48481	1.80405
62	1.08210	0.88295	0.46947	1.88073
63	1.09956	0.89101	0.45399	1.96261
64	1.11701	0.89879	0.43837	2.05030
65	1.13446	0.90631	0.42262	2.14451
66	1.15192	0.91355	0.40674	2.24604
67	1.16937	0.92050	0.39073	2.35585
68	1.18682	0.92718	0.37461	2.47509
69	1.20428	0.93358	0.35837	2.60509
70	1.22173	0.93969	0.34202	2.74748
71	1.23918	0.94552	0.32557	2.90421
72	1.25664	0.95106	0.30902	3.07768
73	1.27409	0.95630	0.29237	3.27085
74	1.29154	0.96126	0.27564	3.48741
75	1.30900	0.96593	0.25882	3.73205
76	1.32645	0.97030	0.24192	4.01078
77	1.34390	0.97437	0.22495	4.33148
78	1.36136	0.97815	0.20791	4.70463
79	1.37881	0.98163	0.19081	5.14455
80	1.39626	0.98481	0.17365	5.67128
81	1.41372	0.98769	0.15643	6.31375
82	1.43117	0.99027	0.13917	7.11537
83	1.44862	0.99255	0.12187	8.14435
84	1.46608	0.99452	0.10453	9.51436
85	1.48353	0.99619	0.08716	11.43005
86	1.50098	0.99756	0.06976	14.30067
87	1.51844	0.99863	0.05234	19.08114
88	1.53589	0.99939	0.03490	28.63625
89	1.55334	0.99985	0.01745	57.28996
90	1.57080	1.00000	-0.00000	**********

EXPLANATION OF THE WEATHER MAP

"Daily Weather Maps", Weekly Series, supersede the former Weather Bureau publication, Daily Weather Map. They include the Surface Weather Map, the 500-Millibar Chart, the Highest and Lowest Temperatures Chart, and the Daily Precipitation Chart. All of the charts for one day are copied on a single page from operational weather maps prepared by the National Meteorological Center, National Weather Service, Washington, D.C. The seven maps for a week are issued in a single booklet mailed to subscribers by Superintendent of Documents, G. P. O., Washington, D.C. 20402.

Symbols on the maps are explained in tables which follow.

The Surface Weather Map presents station data and the analysis for 7:00 a.m./E.S.T. The tracks of well-defined low pressure areas are indicated by chains of arrows; the locations of these centers at times 6, 12, and 18 hours preceding map time are indicated by small black squares enclosing white crosses. Areas of precipitation are indicated by shading. The weather reports that are printed here are only a fraction of those that are included in the operational weather maps, and on which the analyses are based. Occational apparent discrepancies between the printed station data and the analyses result from those station reports that cannot be included in the published maps because of lack of space.

The 500-Millibar Chart presents the height contours and isotherms of the 500-millibar surface at 7:00 a.m./E.S.T. The height contours are shown as continuous lines, and are labeled in feet above sea level. The isotherms are shown as dashed lines, and are labeled in degrees Celsius. The arrows show the wind direction and speed at the 500-millibar level.

The Highest and Lowest Temperatures Chart presents the maximum and minimum values for the 24 hour period ending at 1:00 a.m./E.S.T. The names of the reporting points can be obtained from the Surface Weather Map. The maximum temperature is plotted above the station location, and the minimum temperature is plotted below this point.

The Precipitation Areas and Amounts Chart indicates by means of shading the areas that had precipitation during the 24 hours ending at 1:00 a.m./E.S.T. Amounts in inches to the nearest hundredth of an inch are for the same period. Incomplete totals are underlined. "T" indicates a trace of precipitation. Dashed lines show the depth of snow on the ground in inches as of 7:00 a.m./E.S.T. of the previous day.

Weather maps showing the development and movement of weather systems are among the principal tools used by the weather forecaster. Of the several types of maps used, some portray conditions near the surface of the earth, while others depict conditions at various heights in the atmosphere. Some cover the entire Northern Hemisphere, while others cover only local areas as required for special purposes. The maps used for daily forecasting by Weather Services are similar in many respects to the printed Daily Weather Map. At weather forecast offices, maps showing conditions at the earth's surface are drawn four times daily. Maps of upper level temperature, pressure, and humidity are prepared twice each day.

PRINCIPAL SURFACE WEATHER MAP

To prepare the surface map and present the information quickly and pictorially, two actions are necessary: (1) Weather observers at many places must go to their posts at regular times each day to observe the weather and send the information by wire or radio to the offices where the maps are drawn; and (2) the information must be quickly transcribed to the maps. In order that the necessary speed and economy of space and transmission time may be realized, codes have been devised for sending the information and for plotting it on the maps.

CODES AND MAP PLOTTING

A great deal of information is contained in a brief coded weather message. If each item were named and described in plain language, a very lengthy message would be required; and it would be confusing to read and difficult to transfer to a map. Use of a code permits the message to be condensed to a few five-figure numeral groups, each figure of which has a meaning depending on its position in the message. Persons trained in the use of the code can read the message as easily as plain language.

The location of the reporting station is printed on the map as a small circle (the station circle). A definite arrangement of the data around the station circle, called the station model, is used (see block 1). When the report is plotted in these fixed positions around the station circle on the weather map, many of the code figures are transcribed exactly as sent. Entries in the station model which are not made in code figures or actual values found in the message are usually in the form of symbols which graphically represent the element concerned. In some cases, certain of the data may or may not be reported by the observer, depending on local weather conditions. Precipitation and clouds are examples. In such cases the absence of an entry on the map is interpreted as non-occurrence or non-observance of the phenomena. The letter "M" is entered where data are normally observed but not received by teletypewriter.

Both the code and the station model are based on international agreements. Through such standardized use of numerals and symbols, a meteorologist of one country can use the weather reports and weather maps of another country even though he does not understand the language. Weather codes are, in effect, an international language making possible complete interchange and use of worldwide weather reports so essential in present-day activities.

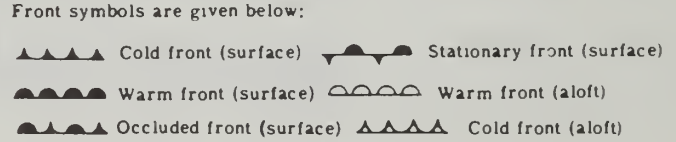
The international code form for surface reports used by the Weather Bureau beginning January 1, 1955, is shown in abridged form in block 1 together with a corresponding sample message. Also included are the symbolic station model used on the printed map, a sample station model entered from the sample message, and an explanation of the symbols with remarks on map entries in block 2.

Many of the elements in the plotting model are entered in values which can be interpreted directly. However, some require reference to code tables. These tables are given in the numbered blocks, 3 through 11 to the right of the station model and explanation of symbols and map entries. Those who wish a more complete explanation of the code are referred to "Federal Meteorological Handbook No. 2, Synoptic Code" (Latest Edition).

FRONTS AND AIR MASSES

The boundary between two different air masses is called a "front." Important changes in weather, temperature, wind direction, and clouds, often occur with the passage of a front. Half circles and/or triangular symbols are placed on the lines representing fronts to indicate the kind of front. The side on which the symbols are placed indicates the direction of frontal movement. The boundary of relatively cold air of polar origin advancing into an area occupied by warmer air, often of tropical origin, is called a "cold front." The boundary of relatively warm air advancing into an area occupied by colder air is called a "warm front." The line along which a cold front has overtaken a warm front at the ground is called an "occluded front." A boundary between two air masses, which shows at the time of observation little tendency to advance into either the warm or cold areas, is called a "stationary front." Air mass boundaries are known as "surface fronts" when they intersect the ground, and as "upper air fronts" when they do not. Surface fronts are drawn in solid black, fronts aloft are drawn in outline only.

Front symbols are given below:



A front which is disappearing or is weak and decreasing in intensity is labeled "Frontolysis."

A front which is forming is labeled "Frontogenesis."

A "squall line" is a line of thunderstorms or squalls usually accompanied by heavy showers and shifting winds, and is indicated as —··—··—··—·.

The paths followed by individual disturbances are called storm tracks and are shown as → →. The symbols ■ indicate past positions of the low pressure center at 6-hour intervals.

"HIGH" (H) and "LOW" (L) indicate the centers of high and low barometric pressure.

Solid lines are isobars and connect points of equal sea level barometric pressure. The spacing and orientation of these lines on weather maps are an indication of speed and direction of wind flow. In general, wind direction is parallel to these lines with low pressure to the left of observer looking downwind. Speed is directly proportional to the closeness of the lines (termed pressure gradient). Isobars are labeled in the metric unit, millibars, and may be converted to inches of mercury by use of the scale in block 12.

Isotherms are lines connecting points of equal temperature. Two isotherms are drawn on the large surface weather map when applicable. The freezing or 32° F. isotherm is drawn as a dashed line (– – –), the 0° F. isotherm is drawn as a dash-dot (–·–·–·) line.

Masses of air are classified to indicate their origin and basic characteristics. For example, the letter P (Polar) denotes relatively cold air from northern regions, and the letter T (Tropical) denotes relatively warm air from southerly regions. Letters placed before P and T indicate air of maritime characteristics (m) or continental characteristics (c). Letters placed after P and T show that the air mass is colder (k) or warmer (w) than the surface over which it is moving. A plus sign (+) between two air mass symbols indicates mixed air masses, and an arrow → between two symbols indicates a transitional air mass changing from one type to the other. Two air mass symbols, one above the other and separated by a line, indicate one air mass aloft and another at lower levels. Air mass symbols are formed by combinations of the following letters:

m = Maritime; c = Continental; A = Arctic; P = Polar, T = Tropical;
E = Equatorial; S = Superior (a warm, dry air mass having its origin aloft);
k = colder, and w = warmer than the surface over which the air mass is moving.

Areas where precipitation is occurring at the time of observation are shaded.

SYMBOLIC FORM OF MESSAGE 1

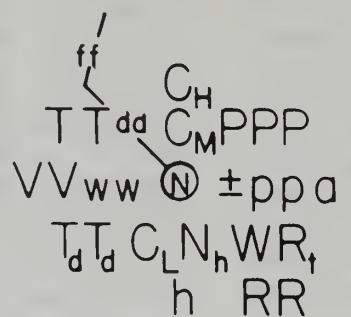
iii Nddff VVwwW PPPTT $N_h C_L h C_M C_H$ TTapp 7RRR$_t$s

Note: This Abridged Code Shows Only Data Normally Plotted on Printed Maps

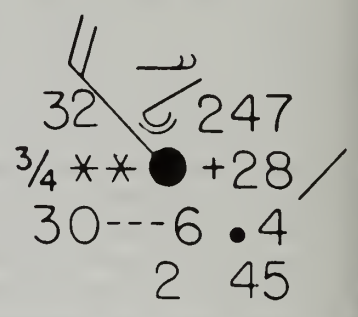
SAMPLE CODED MESSAGE

405 83220 12716 24700 67292 51228 74542

SYMBOLIC STATION MODEL



SAMPLE PLOTTED REPORT



EXPLANATION OF SYMBOLS AND MAP ENTRIES 2

Symbols in order as they appear in the message	Explanation of symbols and decode of example above	Remarks on coding and plotting
iii	Station number 405 = Washington	Usually printed on manuscript maps below station circle. Omitted on Daily Weather Map in favor of printed station names.
N	Total amount of cloud 8 = completely covered	Observed in tenths of cloud cover and coded in Oktas (eighths) according to code table in block 6. Plotted in symbols shown in same table.
dd	True direction from which wind is blowing 32 = 320° = NW	Coded in tens of degrees and plotted as the shaft of an arrow extending from the station circle toward the direction from which the wind is blowing.
ff	Wind speed in knots 20 = 20 knots	Coded in knots (nautical miles per hour) and plotted as feathers and half-feathers representing 10 and 5 knots, respectively, on the shaft of the wind direction arrow. See block 9.
VV	Visibility in miles and fractions 12 = 12/16 or 3/4 miles	Decoded and plotted in miles and fractions up to 3 1/8 miles. Visibilities above 3 1/8 miles but less than 10 miles are plotted to the nearest whole mile. Values higher than 10 miles are omitted from the map.
ww	Present weather 71 = continuous slight snow	Coded in figures taken from the "ww" table (block 8) and plotted in the corresponding symbols same block. Entries for code figures 00, 01, 02, and 03 are omitted from this map.
W	Past weather 6 = rain	Coded in figures taken from the "W" table (block 11) and plotted in the corresponding symbols same block. No entry made for code figures 0, 1, or 2.
N_h	Fraction of sky covered by low or middle cloud 6 = 7 or 8 tenths	Observed and coded in tenths of cloud cover. Plotted on map as code figure in message. See block 7.
C_L	Cloud type 7 = Fractostratus and/or Fractocumulus of bad weather (scud)	Predominating clouds of types in C_L table (block 3) are coded from that table and plotted in corresponding symbols.
h	Height of base of cloud 2 = 300 to 599 feet	Observed in feet and coded and plotted as code figures according to code table in block 3.
C_M	Cloud type 9 = Altocumulus of chaotic sky	See C_M table in block 3.
C_H	Cloud type 2 = Dense cirrus in patches	See C_H table in block 3.
T_dT_d	Temperature of dewpoint 51 = 30° F.	Coded in °C and plotted in actual value in whole degrees F in U.S.A. See block 13.
a	Characteristic of barograph trace 2 = rising steadily or unsteadily	Coded according to table in block 10 and plotted in corresponding symbols.
pp	Pressure change in 3 hours preceding observation 28 = 2.8 millibars	Coded and plotted in units and tenths of millibars.
7	Indicator figure for 6-hour precipitation group.	Not plotted.
RR	Amount of precipitation 45 = 0.45 inches	Coded and plotted in inches to the nearest hundredth of an inch.
R_t	Time precipitation began or ended 4 = 3 to 4 hours ago	Coded and plotted in figures from table in block 4.
s	Depth of snow on ground	Not plotted.
ppp	Barometric Pressure (in millibars) reduced to sea-level 247 = 1024.7 mb.	Coded and plotted in tens, units, and tenths of millibars. The initial 9 or 10 and the decimal point are omitted. See block 12.
TT	Current air temperature 00 = 32°F	Coded in °C and plotted in actual value in whole degrees F in U.S.A. See block 13.

CLOUD ABBREVIATION		C_L	DESCRIPTION (Abridged From W M O Code)		C_M	DESCRIPTION (Abridged From W M O Code)		C_H	DESCRIPTION (Abridged From W M O Code) [3]
St or Fs-Stratus or Fractostratus	1		Cu of fair weather, little vertical development and seemingly flattened	1		Thin As (most of cloud layer semi-transparent)	1		Filaments of Ci, or "mares tails," scattered and not increasing
Ci-Cirrus	2		Cu of considerable development, generally towering, with or without other Cu or Sc bases all at same level	2		Thick As, greater part sufficiently dense to hide sun (or moon), or Ns	2		Dense Ci in patches or twisted sheaves, usually not increasing, sometimes like remains of Cb; or towers or tufts
Cs-Cirrostratus	3		Cb with tops lacking clear-cut outlines, but distinctly not cirriform or anvil-shaped, with or without Cu, Sc, or St	3		Thin Ac, mostly semi-transparent; cloud elements not changing much and at a single level	3		Dense Ci, often anvil-shaped, derived from or associated with Cb
Cc-Cirrocumulus	4		Sc formed by spreading out of Cu; Cu often present also	4		Thin Ac in patches; cloud elements continually changing and/or occurring at more than one level	4		Ci, often hook-shaped, gradually spreading over the sky and usually thickening as a whole
Ac-Altocumulus As-Altostratus	5		Sc not formed by spreading out of Cu	5		Thin Ac in bands or in a layer gradually spreading over sky and usually thickening as a whole	5		Ci and Cs, often in converging bands, or Cs alone; generally overspreading and growing denser, the continuous layer not reaching 45° altitude
Sc-Stratocumulus	6		St or Fs or both, but no Fs of bad weather	6		Ac formed by the spreading out of Cu	6		Ci and Cs, often in converging bands, or Cs alone; generally overspreading and growing denser; the continuous layer exceeding 45° altitude
Ns-Nimbostratus	7		Fs and/or Fc of bad weather (scud)	7		Double-layered Ac, or a thick layer of Ac, not increasing; or Ac with As and/or Ns	7		Veil of Cs covering the entire sky
Cu or Fc-Cumulus or Fractocumulus	8		Cu and Sc (not formed by spreading out of Cu) with bases at different levels	8		Ac in the form of Cu-shaped tufts or Ac with turrets	8		Cs not increasing and not covering entire sky
Cb-Cumulonimbus	9		Cb having a clearly fibrous (cirriform) top, often anvil-shaped, with or without Cu, Sc, St, or scud	9		Ac of a chaotic sky, usually at different levels; patches of dense Ci are usually present also	9		Cc alone or Cc with some Ci or Cs, but the Cc being the main cirriform cloud

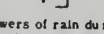
R_t	TIME OF PRECIPITATION [4]	h	HEIGHT IN FEET (Rounded Off)	HEIGHT IN METERS [5] (Approximate)	N	SKY COVERAGE [6] (Total Amount)	N_h	SKY COVERAGE [7] (Low And/Or Middle Clouds)
0	No Precipitation	0	0 - 149	0 - 49		No clouds	0	No clouds
1	Less than 1 hour ago	1	150 - 299	50 - 99		Less than one-tenth or one-tenth	1	Less than one-tenth or one-tenth
2	1 to 2 hours ago	2	300 - 599	100 - 199		Two-tenths or three-tenths	2	Two-tenths or three-tenths
3	2 to 3 hours ago	3	600 - 999	200 - 299		Four-tenths	3	Four-tenths
4	3 to 4 hours ago	4	1,000 - 1,999	300 - 599		Five-tenths	4	Five-tenths
5	4 to 5 hours ago	5	2,000 - 3,499	600 - 999		Six-tenths	5	Six-tenths
6	5 to 6 hours ago	6	3,500 - 4,999	1,000 - 1,499		Seven-tenths or eight-tenths	6	Seven-tenths or eight-tenths
7	6 to 12 hours ago	7	5,000 - 6,499	1,500 - 1,999		Nine-tenths or overcast with openings	7	Nine-tenths or overcast with openings
8	More than 12 hours ago	8	6,500 - 7,999	2,000 - 2,499		Completely overcast	8	Completely overcast
9	Unknown	9	At or above 8,000, or no clouds	At or above 2,500, or no clouds		Sky obscured	9	Sky obscured

Symbol VV=Horizontal Visibility

Code Figure	Statute Mile	Code Figure	Statute Mile	Code Figure	Statute Mile
00	under 1/16	65	9 3/8	83	28 1/2
		66	10	84	31 1/4
01 to 50	1/16 to 3 1/8 *	67	10 5/8	85	34 3/8
		68	11 1/4	86	37 1/2
		69	11 7/8	87	40 5/8
(* Divide code by 16)		70	12 1/2	88	43 3/4
		71	13 1/8	89	over 43 3/4
51-55	not used	72	13 3/4	90	under 1/32
		73	14 3/8		
56	3 1/4	74	15	91	1/32
57	4 3/8	75	15 3/8	92	1/8
58	5	76	16 1/4	93	5/16
59	5 3/8	77	16 7/8	94	5/8
60	6 1/4	78	17 1/2	95	1 1/4
61	6 7/8	79	18 1/8	96	2 1/2
62	7 1/2	80	18 3/4	97	6 1/4
63	8 1/8	81	21 7/8	98	12 1/2
64	8 3/4	82	25	99	31 1/4 or more

NOTES:
(1) The values given are discrete values (i.e., not ranges). If the observed visibility is between two of the reportable distances as given in the table, the code figure of the lower reportable distance shall be reported.
(2) Only the code figures 00-89 shall be used in reports from land stations.
(3) In reporting visibility at sea the decade 90-99 shall be used.

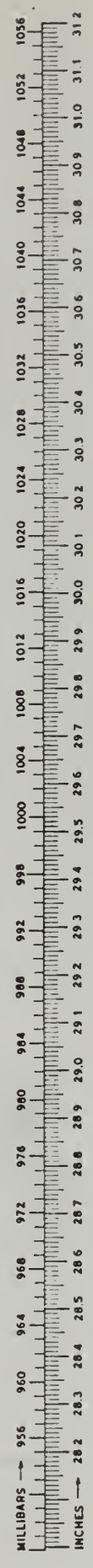
WW PRESENT WEATHER (Descriptions Abridged from W. M. O. Code)

	0	1	2	3	4	5	6	7	8	9
00	Cloud development NOT observed or NOT observable during past hour	Clouds generally dissolving or becoming less developed during past hour	State of sky on the whole unchanged during past hour	Clouds generally forming or developing during past hour	Visibility reduced by smoke	Haze	Widespread dust in suspension in the air, NOT raised by wind, at time of observation	Dust or sand raised by wind, at time of observation	Well developed dust devil(s) within past hour	Dust storm or sand storm within sight of or at station during past hour
10	Light fog	Patches of shallow fog at station, NOT deeper than 6 feet on land	More or less continuous shallow fog at station, NOT deeper than 6 feet on land	Lightning visible, no thunder heard	Precipitation within sight, but NOT reaching the ground	Precipitation within sight, reaching the ground, but distant from station	Precipitation within sight, reaching the ground, near to but NOT at station	Thunder heard, but no precipitation at the station	Squall(s) within sight during past hour	Funnel cloud(s) within sight during past hour
20	Drizzle (NOT freezing and NOT falling as showers) during past hour, but NOT at time of observation	Rain (NOT freezing and NOT falling as showers) during past hour, but NOT at time of observation	Snow (NOT falling as showers) during past hour, but NOT at time of observation	Rain and snow (NOT falling as showers) during past hour, but NOT at time of observation	Freezing drizzle or freezing rain (NOT falling as showers) during past hour, but NOT at time of observation	Showers of rain during past hour, but NOT at time of observation	Showers of snow, or of rain and snow, during past hour, but NOT at time of observation	Showers of hail, or of hail and rain, during past hour, but NOT at time of observation	Fog during past hour, but NOT at time of observation	Thunderstorm (with or without precipitation) during past hour, but NOT at time of obs.
30	Slight or moderate dust storm or sand storm, has decreased during past hour	Slight or moderate dust storm or sand storm, no appreciable change during past hour	Slight or moderate dust storm or sand storm, has increased during past hour	Severe dust storm or sand storm, has decreased during past hour	Severe dust storm or sand storm, no appreciable change during past hour	 Severe dust storm or sand storm, has increased during past hour	Slight or moderate drifting snow, generally low	Heavy drifting snow, generally low	Slight or moderate drifting snow, generally high	Heavy drifting snow, generally high
40	Fog at distance at time of observation, but NOT at station during past hour	Fog in patches	Fog, sky discernible, has become thinner during past hour	Fog, sky NOT discernible, has become thinner during past hour	Fog, sky discernible, no appreciable change during past hour	Fog, sky NOT discernible, no appreciable change during past hour	Fog, sky discernible, has begun or become thicker during past hour	Fog, sky NOT discernible, has begun or become thicker during past hour	Fog, depositing rime, sky discernible	Fog, depositing rime, sky NOT discernible
50	Intermittent drizzle (NOT freezing) slight at time of observation	Continuous drizzle (NOT freezing) slight at time of observation	Intermittent drizzle (NOT freezing) moderate at time of observation	Continuous drizzle (NOT freezing), moderate at time of observation	Intermittent drizzle (NOT freezing), thick at time of observation	Continuous drizzle (NOT freezing), thick at time of observation	Slight freezing drizzle	Moderate or thick freezing drizzle	Drizzle and rain, slight	Drizzle and rain, moderate or heavy
60	Intermittent rain (NOT freezing), slight at time of observation	Continuous rain (NOT freezing), slight at time of observation	Intermittent rain (NOT freezing) moderate at time of obs.	Continuous rain (NOT freezing), moderate at time of observation	Intermittent rain (NOT freezing), heavy at time of observation	Continuous rain (NOT freezing), heavy at time of observation	Slight freezing rain	Moderate or heavy freezing rain	Rain or drizzle and snow, slight	Rain or drizzle and snow, moderate or heavy
70	Intermittent fall of snowflakes, slight at time of observation	Continuous fall of snowflakes, slight at time of observation	Intermittent fall of snowflakes, moderate at time of observation	Continuous fall of snowflakes, moderate at time of observation	Intermittent fall of snowflakes, heavy at time of observation	Continuous fall of snowflakes, heavy at time of observation	Ice needles (with or without fog)	Granular snow (with or without fog)	Isolated star like snow crystals (with or without fog)	Ice pellets (sleet, U. S. definition)
80	Slight rain shower(s)	Moderate or heavy rain shower(s)	Violent rain shower(s)	Slight shower(s) of rain and snow mixed	Moderate or heavy shower(s) of rain and snow mixed	Slight snow shower(s)	Moderate or heavy snow shower(s)	Slight shower(s) of soft or small hail with or without rain, or rain and snow mixed	Moderate or heavy shower(s) of soft or small hail with or without rain, or rain and snow mixed	Slight shower(s) of hail, with or without rain or rain and snow mixed, not associated with thunder
90	Moderate or heavy shower(s) of hail, with or without rain or rain and snow mixed, not associated with thunder	Slight rain at time of observation, thunderstorm during past hour, but NOT at time of observation	Moderate or heavy rain at time of observation, thunderstorm during past hour, but NOT at time of observation	Slight snow or rain and snow mixed or hail at time of observation, thunderstorm during past hour, but NOT at time of observation	Moderate or heavy snow, or rain and snow mixed or hail at time of observation, thunderstorm during past hour, but NOT at time of obs.	Slight or moderate thunderstorm without hail, but with rain and/or snow at time of obs.	Slight or moderate thunderstorm, with hail at time of observation	Heavy thunderstorm, without hail, but with rain and/or snow at time of observation	Thunderstorm combined with dust storm or sand storm at time of obs.	Heavy thunderstorm with hail at time of observation

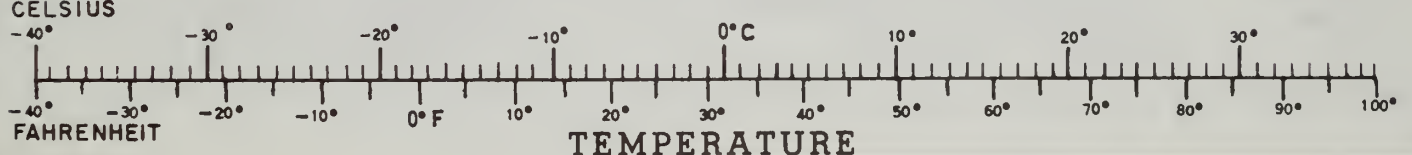
ff	(MILES) (Statute) Per Hour	9 KNOTS
◎	Calm	Calm
—	1 - 2	1 - 2
⟍	3 - 8	3 - 7
⟍	9 - 14	8 - 12
⟍	15 - 20	13 - 17
⟍	21 - 25	18 - 22
⟍	26 - 31	23 - 27
⟍	32 - 37	28 - 32
⟍	38 - 43	33 - 37
⟍	44 - 49	38 - 42
⟍	50 - 54	43 - 47
⟍	55 - 60	48 - 52
⟍	61 - 66	53 - 57
⟍	67 - 71	58 - 62
⟍	72 - 77	63 - 67
⟍	78 - 83	68 - 72
⟍	84 - 89	73 - 77
⟍	119 - 123	103 - 107

Code Number	a	10 BAROMETRIC TENDENCY	
0	⌒	Rising, then falling	
1	⌒	Rising, then steady; or rising, then rising more slowly	Barometer now higher than 3 hours ago
2	/	Rising steadily, or unsteadily	
3	✓	Falling or steady, then rising; or rising, then rising more quickly	
4	—	Steady, same as 3 hours ago	
5	⌣	Falling, then rising, same or lower than 3 hours ago	
6	⌣	Falling, then steady; or falling, then falling more slowly	Barometer now lower than 3 hours ago
7	\	Falling steadily, or unsteadily	
8	⌣	Steady or rising, then falling; or falling, then falling more quickly	

Code Number	W	11 PAST WEATHER	
0		Clear or few clouds	Not Plotted
1		Partly cloudy (scattered) or variable sky	
2		Cloudy (broken) or overcast	
3	≡	Sandstorm or dust-storm, or drifting or blowing snow	
4	≡	Fog, or smoke, or thick dust haze	
5	,	Drizzle	
6	•	Rain	
7	*	Snow, or rain and snow mixed, or ice pellets (sleet)	
8	▽	Shower(s)	
9	⌐	Thunderstorm, with or without precipitation	



13 Temperatures and dew points are coded in °C but plotted in °F on U.S. Surface Charts. Temperatures below 0°C are coded by dropping minus sign and adding 50. Thus, -5°C is coded as 55.



AVIATION WEATHER REPORTS

N-S SEQ 220000 22 FEBRUARY 1971 0000Z MAP TIME

MLI M17⊕8 189/31/23/0610/006/ PRESRR
STL M9V⊕11/2RF 082/35/35/0517G26/975/ CIG 7V11
MEM 20E5⊕2IRWF 961/68/64/2514G20/941/ T ALQDS MOVG N FQT LTGICCG
PK WND 13/25 37 PCPN 55
JAN M30⊕10 970/75/66/1625G42/944/ PK WND 17/42 47 OCNL LTGCG NW
RADAT 43127
BTR M16⊕4RW-K 997/71/69/2015/951/ RB05 50708 14// 82
MSY M21⊕7 025/75/68/1818G26/960/ CIG RGD

W-E SEQ 220000 22 FEBRUARY 1971 0000Z MAP TIME

FTW M23⊕15+ 054/35/25/2726/968/ PK WND 27/36 31 RADAT 58009
SHV 23◐12+ 007/53/42/2518/955
JAN M30⊕10 970/75/66/1625G42/944/ PK WND 17/42 47 OCNL LTGCG NW
RADAT 43127
MGM M33◐55⊕7 081/70/63/1509/976/ RADAT 38126
ATL W1X1/2F 120/57/54/0911/989/ R09RVR60+
CLT M4◐17⊕1R--F 161/52/51/0605/000/ 05VR60+R05VR60+
ORF E100◐220⊕10 186/49/39/0905/007
DCA E220⊕12 196/49/37/1005/010

Subsequent record observations at Charlotte, N.C.:

0100 CLT 40M14⊕4F 161/52/51/0106/000/ RE35
0200 CLT M6◐14⊕4F 161/52/51/0405/000
0300 CLT 20M5◐11⊕2L-F 161/52/52/0205/000/ LB45 400 17//
0400 CLT 40M15⊕2F 148/52/52/1004/996/ LE30
0500 CLT M3⊕4F 144/53/52/1106/995
0600 CLT W1X1/2F 141/53/53/1503/994/ R05VR50V60+

KEY TO AVIATION WEATHER REPORTS.....

FEBRUARY 1972

LOCATION IDENTIFIER AND TYPE OF REPORT*	SKY AND CEILING	VISIBILITY, WEATHER, AND OBSTRUCTION TO VISION	SEA-LEVEL PRESSURE	TEMPERATURE AND DEW POINT	WIND	ALTIMETER SETTING	RUNWAY VISUAL RANGE	CODED PIREPS
MKC	15◐M25⊕	1R-K	132	/58/56	/18Ø7	/993/	RØ4LVR2ØV4Ø	/⊕55

SKY
Sky cover symbols are in ascending order. Figures preceding symbols are heights in hundreds of feet above station.

Sky cover symbols are
○ Clear. Less than 0.1 sky cover
◑ Scattered. 0.1 to less than 0.6 sky cover
◐ Broken. 0.6 to 0.9 sky cover
⊕ Overcast. More than 0.9 cover
— Thin (When prefixed to the above symbols)
–X Partly obscured. 0.1 to less than 1.0 sky hidden by precipitation or obstruction to vision (bases at surface)
X Obscured. 1.0 sky hidden by precipitation or obstruction to vision (bases at surface)

CEILING
Letter preceding height of layer identifies ceiling layer and indicates how ceiling height was obtained. Thus

A	Aircraft	R	Radar
B	Balloon (ceiling pilot, or raob)	W	Indefinite
E	Estimated	V	Immediately following numerical value indicates a variable ceiling height
M	Measured		

VISIBILITY
Reported in statute miles and fractions (V Variable). The symbol + indicates visibility greater than that being reported.

WEATHER AND OBSTRUCTION TO VISION SYMBOLS

A	Hail	IC	Ice Crystals	RW	Rain Showers
BD	Blowing Dust	IF	Ice Fog	S	Snow
BN	Blowing Sand	IP	Ice Pellets	SG	Snow Grains
BS	Blowing Snow	IPW	Ice Pellet Showers	SP	Snow Pellets
D	Dust	K	Smoke	SW	Snow Showers
I	Fog	L	Drizzle	T	Thunderstorm
GF	Ground Fog	R	Rain	T+	Severe Thunderstorm
H	Haze			ZL	Freezing Drizzle
				ZR	Freezing Rain

Precipitation intensities are indicated thus
Very Light Light (no sign) Moderate + Heavy

WIND
Direction in tens of degrees from true north, speed in knots. 0000 indicates calm. G indicates gusty. Peak speed follows G or Q when gusts or squalls are reported. The contraction WSHFT followed by GMT time group in remarks indicates windshift and its time of occurrence. (Knots X 1.15 = statute mi/hr.)

EXAMPLES 3627 360 degrees, 27 knots
3627G40 360 degrees, 27 knots, peak speed in gusts 40 knots

ALTIMETER SETTING
The first figure of the actual altimeter setting is always omitted from the report.

RUNWAY VISUAL RANGE (RVR)
RVR is reported from some stations. Extreme values for 10 minutes prior to observation are given in hundreds of feet. Runway identification precedes RVR report.

CODED PIREPS
Pilot reports of clouds not visible from ground are coded with MSL height data preceding and/or following sky cover symbol to indicate cloud bases and/or tops, respectively.

DECODED REPORT
Kansas City. Record observation. 1500 feet scattered, measured ceiling 2500 feet overcast, visibility 1 mile, light rain, smoke, sea level pressure 1013.2 millibars, temperature 58°F, dewpoint 56°F, wind 180°, 7 knots, altimeter setting 29.93 inches, runway 04 left, visual range 2000 feet variable to 4000. Pilot reports top of overcast 5500 feet (MSL).

***TYPE OF REPORT**
The omission of type of report data identifies a scheduled record observation for the hour specified in the sequence heading; the time of an out-of-sequence special observation is given as SP followed by a time group (24-hour clock GMT) e.g. PIT SP 0715 XM1⊕. A special indicates a significant change in one or more elements. Local reports are identified by LCL and a time group. Locals are transmitted on local teletypewriter circuits only.

Radar Summary Chart Legend

Weather radar stations report each hour using a special teletype code "SD" (Storm Detection) for these "RAREPS" (Radar Reports). Each RAREP gives the character of echoes (cell, area, line, layer, spiral band, etc.), weather phenomena associated with the echoes, intensity trend of echoes, the location and dimensions of echoes and their movement, and the height of the tops of echoes. These data collected and plotted on a chart result in the hourly Radar Summary Chart transmitted on the national weather facsimile circuit. This product constitutes a unique type of "weather map" providing synoptic radar weather data.

GENERAL

Two methods of data depiction appear on these charts. East of the Rockies radar reports are plotted and grouped in certain configurations. West of the Rockies actual echo patterns from ARTC radar sites are shown. Most of the symbols used are common to both sections of the map.

SURFACE WEATHER ASSOCIATED WITH ECHOES

T	Thunderstorm	P	Ice Pellets
R	Rain	L	Drizzle
RW	Rain Showers	ZR	Freezing Rain
S	Snow	ZL	Freezing Drizzle
SW	Snow Showers	A	Hail

PRECIPITATION INTENSITY

— —	Very Light	+	Heavy
—	Light	+ +	Very Heavy
No Sign	Moderate	U	Unknown

Intensity of echoes is given in terms of the estimated precipitation intensity. No intensity is ascribed to drizzle, hail, sleet or snow. Echoes located farther than a specified range, usually 125 nautical miles, are given an intensity of unknown or "U".

INTENSITY TREND *

\+ Increasing NEW New Development

— Decreasing

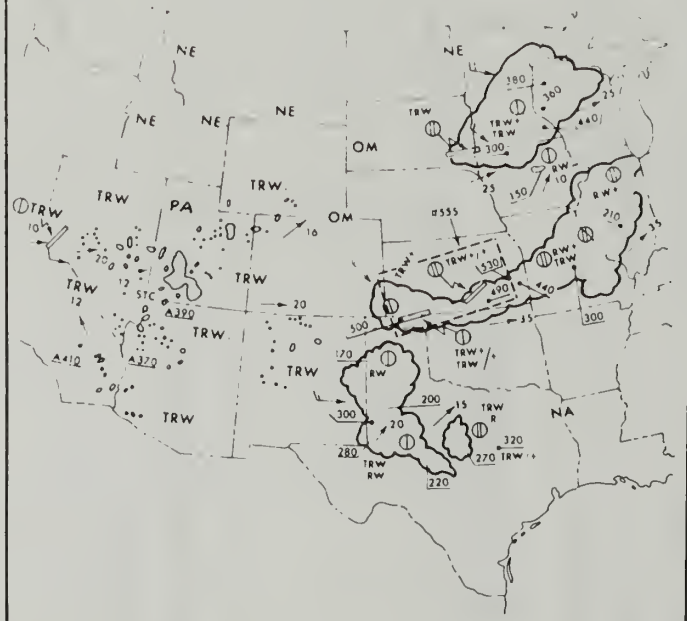
Intensity trend follows the precipitation intensity and is preceded by a slash mark.

STATUS OF EQUIPMENT

NE	No echoes
NA	Observation not available
OM	Equipment out for maintenance
CP	Moderate to strong echoes reported only
STC	Reduced detection capability within 30 miles of radar
MAG	Radar on reduced power

Last three items from ARTC reports only

SAMPLE RADAR SUMMARY CHART
WW NR 555 Valid Til 0200Z



MOTION OF ECHOES

V V Cell Movement - Speed in knots

Area or Line movement..(10 kts/barb)

LM Little movement

ECHO HEIGHTS

hhh Height of echo tops

hhh Height of maximum echo top

hhh Height of echo bases

hhh Height of melting level

Ahhh Visual cloud top seen by aircraft

Heights are in hundreds of feet MSL.

CHARACTER OF ECHOES

Area of echoes

Line of echoes

Solid-Over .9 coverage #

Broken-Over .5 to .9 coverage #

Scattered- .1 to .5 coverage #

Widely Scattered-less than .1 coverage #

Strong or very strong cell identified by one station

Strong or very strong cell identified by two or more stations

Actual echo boundary copied from ARTC scopes

PA Partly Aloft

MA Mostly Aloft

* Absence of a symbol means that there has been no change in the intensity.

Severe Weather Watch areas are outlined with dashed lines and have notation of the number and valid time of watch.

Layers aloft associated with other echoes will be preceded by acronym for partly aloft or mostly aloft.

Coverage within area or line.

BEAUFORT WIND SCALE

		m/sec	mph	knots
0	Calm	< .6	< 1	< 1
1	Light Air	.6-1.7	1-3	1-3
2	Slight Breeze	1.8-3.3	4-7	4-6
3	Gentle Breeze	3.4-5.2	8-11	7-10
4	Moderate Breeze	5.3-7.4	12-16	10-14
5	Fresh Breeze	7.5-9.8	17-22	15-19
6	Strong Breeze	9.9-12.4	23-27	19-24
7	Moderate Gale	12.5-15.2	28-34	24-30
8	Fresh Gale	15.3-18.2	35-41	30-35
9	Strong Gale	18.3-21.5	42-48	36.42
10	Whole Gale	21.6-25.4	49-56	42-49
11	Storm	25.5-29.0	57-67	49-56
12	Hurricane	> 29.0	> 67	> 56

TIME AND DATE CONVERSIONS

	GMT	EST	CST	MST	PST
GMT =	+ 0 hrs.	+ 5	+ 6	+ 7	+ 8
EST* =	- 5	+ 0	+ 1	+ 2	+ 3
CST* =	- 6	- 1	+ 0	+ 1	+ 2
MST* =	- 7	- 2	- 1	+ 0	+ 1
PST* =	- 8	- 3	- 2	- 1	+ 0

*for daylight savings time, add 1 hour

JULIAN DATES

Jan 1	1
Feb 1	32
Mar 1*	59
Apr 1*	90
May 1*	120
June 1*	151
July 1*	181
Aug 1*	212
Sep 1*	243
Oct 1*	273
Nov 1*	304
Dec 1*	334

*for leap year, add 1

1950 EPHEMERIS OF THE SUN (apparent declination)*

DAY	JAN.	FEB.	MAR.	APR.	MAY	JUN.	JUL.	AUG.	SEP.	OCT.	NOV.	DEC.
1	-23°04'	-17°19'	-7°53'	+4°14'	+14°50'	+21°57'	+23°10'	+18°14'	+8°35'	-2°53'	-14°11'	-21°41'
2	22 59	17 02	7 30	4 37	15 08	22 05	23 06	17 59	8 13	3 16	14 30	21 51
3	22 54	16 45	7 07	5 00	15 26	22 13	23 01	17 43	7 51	3 39	14 49	22 00
4	22 48	16 27	6 44	5 23	15 44	22 21	22 57	17 28	7 29	4 02	15 08	22 08
5	22 42	16 10	6 21	5 46	16 02	22 28	22 52	17 12	7 07	4 26	15 27	22 17
6	22 35	15 51	5 59	6 09	16 19	22 34	22 47	16 56	6 45	4 49	15 45	22 24
7	22 28	15 33	5 35	6 32	16 36	22 41	22 41	16 39	6 22	5 12	16 03	22 32
8	22 20	15 14	5 12	6 54	16 52	22 47	22 34	16 23	6 00	5 35	16 21	22 38
9	22 12	14 55	4 48	7 17	17 09	22 52	22 28	16 06	5 37	5 58	16 38	22 45
10	22 04	14 36	4 25	7 39	17 25	22 57	22 21	15 48	5 15	6 21	16 56	22 51
11	21 56	14 17	4 01	8 01	17 41	23 02	22 13	15 31	4 52	6 43	17 13	22 56
12	21 46	13 57	3 38	8 24	17 56	23 06	22 05	15 13	4 29	7 06	17 29	23 02
13	21 37	13 37	3 14	8 46	18 11	23 10	21 57	14 55	4 06	7 29	17 45	23 06
14	21 27	13 17	2 50	9 07	18 26	23 14	21 49	14 37	3 43	7 51	18 02	23 10
15	21 16	12 57	2 27	9 29	18 41	23 17	21 40	14 19	3 20	8 13	18 17	23 14
16	21 05	12 36	2 03	9 50	18 55	23 19	21 30	14 00	2 57	8 36	18 33	23 17

1950 EMPHEMERIS OF THE SUN (apparent declination)* continued

DAY	JAN.	FEB.	MAR.	APR.	MAY	JUN.	JUL.	AUG.	SEP.	OCT.	NOV.	DEC.
17	21 54	12 15	1 39	10 12	19 09	23 22	21 21	13 41	2 34	8 58	18 48	23 20
18	20 42	11 54	1 16	10 33	19 22	23 24	21 10	13 22	2 11	9 20	19 03	23 22
19	20 30	11 33	0 52	10 54	19 36	23 25	21 00	13 03	1 48	9 42	19 17	23 24
20	20 18	11 12	0 28	11 15	19 49	23 26	20 49	12 43	1 24	10 03	19 31	23 25
21	20 05	10 50	-0 05	11 35	20 02	23 27	20 38	12 23	1 01	10 25	19 45	23 26
22	19 51	10 29	+0 19	11 56	20 14	23 27	20 27	12 03	0 38	10 46	19 58	23 27
23	19 38	10 07	0 43	12 16	20 23	23 27	20 15	11 43	+0 14	11 08	20 11	23 27
24	19 24	9 45	1 07	12 36	20 37	23 26	20 03	11 23	-0 09	11 29	20 24	23 26
25	19 09	9 23	1 30	12 56	20 49	23 25	19 50	11 02	0 32	11 50	20 36	23 25
26	18 55	9 01	1 54	13 16	20 59	23 24	19 37	10 42	0 56	12 10	20 48	23 24
27	18 40	8 38	2 17	13 35	21 10	23 22	19 24	10 21	1 19	12 31	20 59	23 22
28	18 24	-8 16	2 41	13 54	21 20	23 20	19 11	10 00	1 43	12 51	21 10	23 20
29	18 08		3 04	14 13	21 30	23 17	18 57	9 39	2 06	13 13	21 21	23 17
30	17 52		3 28	+14 32	21 39	+23 14	18 43	9 18	-2 29	13 31	-21 31	23 13
31	-17 36		+3 51		+21 48		+18 28	+8 56		-13 51		-23 10

*Values of apparent declination flucuate from year to year, but for most meteorological work the above values are more than sufficient. For more accurate data consult the Nautical Almanac

SKEW T, log p DIAGRAM

EXPLANATION

ISOBARS are straight, horizontal brown lines. The heights of the pressure surfaces in the ICAO Standard atmosphere, below the pressure values on the left, are in paren these ( ) for values in feet and brackets [ ] for meter values.

ISOTHERMS (°C) are the straight, equidistant brown lines running diagonally upward from left to right.

DRY ADIABATS are the slightly curved brown lines that intersect the 1000 mb iso bar at intervals of 2°C, and run diagonally upward from right to left. The Dry Adiabats for the overlap portion of the pressure range are labeled with two values. (See below.)

SATURATION ADIABATS are the curved green lines that intersect the 1000 mb iso bar at intervals of 2°C, diverging upward and tending to become parallel to the dry adiabats.

SATURATION MIXING RATIO (in gm. per kg.) is represented by dashed green lines. The values appear between the 1000 and 950 mb. lines.

THICKNESS (in hundreds of geopotential feet and meters) of the layers 1000-700, 1000-500, 700-500, 500-300, 300-200, 200-150, 150-100, 100-50, and 50-25 mb. is represented by numbers and a graduation along the middle of each layer. The thicknesses are obtained from the virtual temperature curve by the equal area method, using any straight line as a dividing line.

HEIGHT in geopotential feet or meters above mean sea level, or station level of the 1000 mb. surface is obtained from the nomogram in the upper left hand corner by drawing a straight line from the temperature scale (°F) or (°C) through the point p_o (mean sea level or station pressure) on the pressure scale, and reading height on the appropriate height scale.

ICAO STANDARD ATMOSPHERE SOUNDING is indicated by a thick brown line.

The saturated adiabats and isopleths of saturation mixing ratio are computed by use of vapor pressure over a plane water surface at all temperatures.

Extension of chart to 25 mb. has been accomplished by overlap with pressure indi cated in brackets [100] at 400 mb. and [25] at 100 mb. Dry adiabats for the overlap are labeled in parentheses ( ).

APPROXIMATE VIRTUAL TEMPERATURE may be obtained from the formula $T_v \simeq T + \frac{w}{6}$ where T_v is virtual temperature in °C, T is free air temperature in °C, and w is mixing ratio in grams/kilograms. For purposes of thickness computation, use the mean tem perature of the layer for T and use the mean mixing ratio of the layer for w.

Black dots ● along wind scale line indicate the levels for which wind data are reported and plotted. The open circles ○ indicate the mandatory pressure levels at which wind data are also entered.

All heights used in this diagram are in geopotential feet and meters.

Note: Orange supplants brown in this edition.

(Permission U.S. Air Force Air Weather Service)

NUMBER	STATION
TIME (GCT)	DATE (GCT)

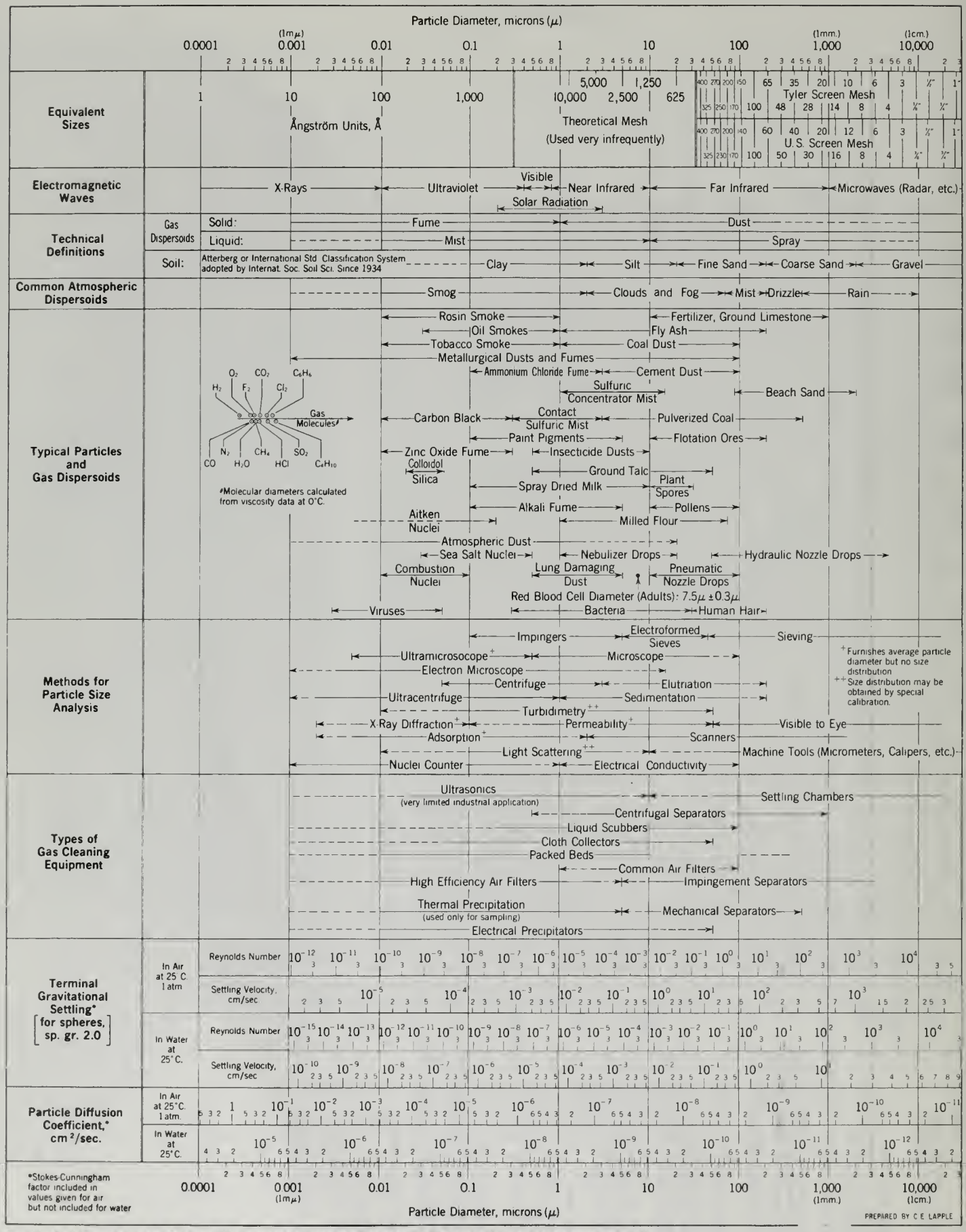
TEMPERATURE IN DEGREES FAHRENHEIT AND CELSIUS

WIND SCALE

ICAO STANDARD ATMOSPHERE ALTITUDE
THOUSANDS OF METERS
THOUSANDS OF FEET

FAHRENHEIT TEMPERATURE SCALE

CHARACTERISTICS OF PARTICLES AND PARTICLE DISPERSOIDS



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AMBIENT AIR QUALITY STANDARDS (EPA)

Pollutant	Average Sample Time	National[1] Primary[3]	National[1] Secondary	California[2]
Photochem oxidants[5]	1 hr	160 $\mu g/m^3$ (.08 ppm)	same	200 $\mu g/m^2$ (.10 ppm)
CO	1 hr	40 mg/m^3 (35 ppm)	same	46 mg/m^3 (40 ppm)
	8 hr	10 mg/m^3 (9 ppm)	same	--
	12 hr	--	--	11 mg/m^3 (10 ppm)
NO_2	1 hr	--	--	470 $\mu g/m^3$ (.25 ppm)
	Annual Mean	100 $\mu g/m^3$ (.05 ppm)	same	--
SO_2	1 hr	--	--	1310 $\mu g/m^3$ (.5 ppm)
	3 hr	--	1300 $\mu g/m^3$ (.5 ppm)	--
	24 hr	365 $\mu g/m^3$ (.14 ppm)	260 $\mu g/m^3$ (.10 ppm)	105 $\mu g/m^3$ (.04 ppm)
	Annual Mean	80 $\mu g/m^3$ (.03 ppm)	60 $\mu g/m^3$ (.02 ppm)	--
Pb	30 day Mean	--	--	1.5 $\mu g/m^3$
Hydrogen Sulfide	1 hr	--	--	42 $\mu g/m^3$ (.03 ppm)
Hydrocarbons[6]	3 hr (6-9 am)	160 $\mu g/m^3$ (.24 ppm)	same	--
Ethylene	1 hr	--	--	.5 ppm
	8 hr	--	--	.1 ppm
Particulate[7]	24 hr	260 $\mu g/m^3$	150 $\mu g/m^3$	100 $\mu g/m^3$
	Annual Geometric Mean	75 $\mu g/m^3$	60 $\mu g/m^3$	60 $\mu g/m^3$
Visibility	1 observation	--	--	Reduces visibility to < 10 mi with RH < 70%

[1] Not to be exceeded more than once a year
[2] Not to be exceeded or equaled
[3] Margin of safety to preserve public health
[4] Necessary level to protect public welfare
[5] Corrected for NO_2
[6] Corrected for Methane
[7] Suspend material

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